PAVER™ 6.5

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User Manual

PAVER™ 6.5

US Army Corps of Engineers
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Construction Engineering Research Laboratory

M. Y. (Mo) Shahin, Ph.D., P.E.
William Welborn, USACE
Lindsi Hammond, USACE
Simon Kim, Ph.D., Contractor
Ryan Meisel, P.E., Contractor
Lindsey Cerda, Contractor
Sam Franzen, Contractor

http://www.cecer.army.mil/paver
www.PAVERTeam.com

PAVER™ 6.5
User Manual

Acknowledgments

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M.Y. (Mo) Shahin
PAVER™ Program Manager
US Army Corps of Engineers, ERDC, CERL

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1 Overview

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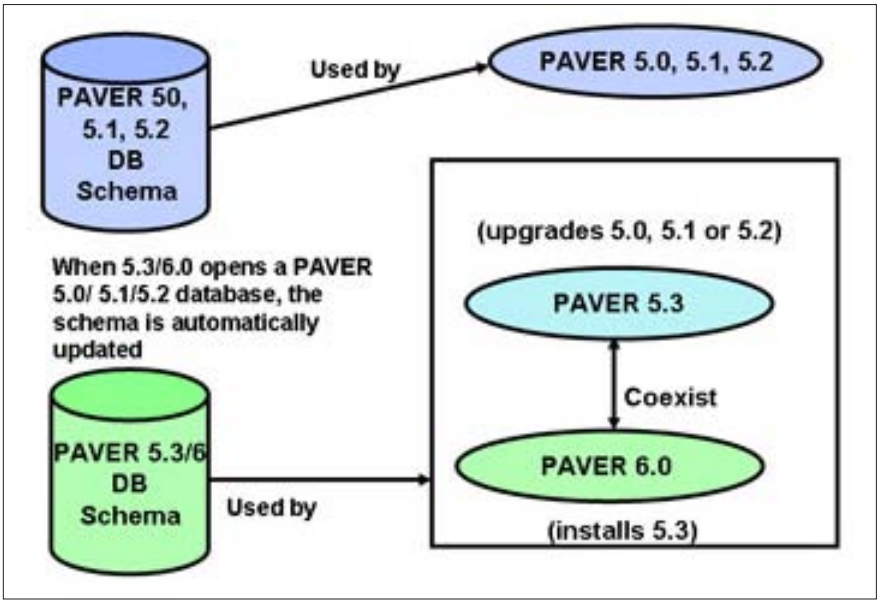
System Requirements

Recommended Hardware

- Processor Speed: 1 GHz or faster
- Memory: 2 GB RAM

Updating To PAVER™ 6

For PAVER™ 5.x users, the conversion to PAVER™ 6 is an easy procedure. Once the PAVER™ 6 program is installed onto your computer, it will automatically update PAVER™ 5.0-5.2 versions to the PAVER™ 5.3 version. PAVER™ 5.3 serves as a migration tool between PAVER™ 5.0-5.2 versions and PAVER™ 6. PAVER™ 5.3 supports the import/export of *.e50 files from PAVER™ 5.0-5.2 as well as *.e60 and *.e65 files from PAVER™ 6 and 6.5.



Note
When converting from an earlier version of PAVER™, the recommended procedure is to: 1) backup the database being imported and 2) run the verification tools on the imported database in version 5.3/6.

PAVER™ 6.5 Licensing

Activation Screen

Enter the serial number on the PAVER™ activation page in order to activate buttons which will allow you to activate your copy of PAVER™.

PAVER Activation
Before using PAVER, you must follow the steps below:
Enter the serial number from your copy of PAVER here:
Automated Web Activation
Manual Web Activation
EMail Activation
Phone Activation
Cancel

When the serial number is entered the screen will look as shown below:

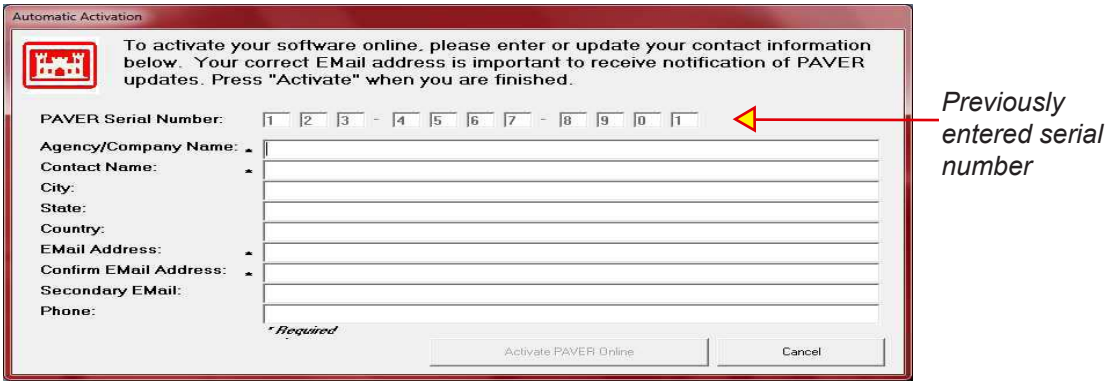
PAVER Activation
Before using PAVER, you must follow the steps below:
Enter the serial number from your copy of PAVER here: A A A - A A A A - A A A A
Automated Web Activation
Manual Web Activation
EMail Activation
Phone Activation
Cancel

Choose one of the following four options:

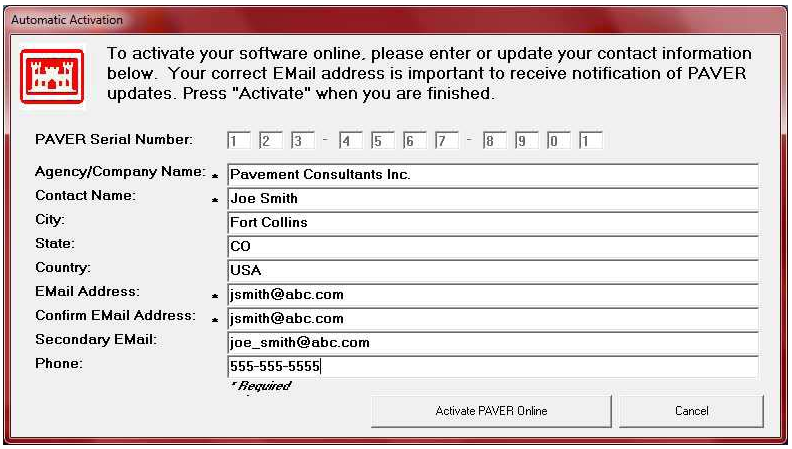
- Automated Web Activation: Select to activate your copy of PAVER™ automatically online.
- Manual Web Activation: Select to activate your copy of PAVER™ via a website.
- Email Activation: Select to activate your copy of PAVER™ via email (an email application such as Outlook must be used with this option).
- Phone Activation: Select to activate your copy of PAVER™ over the phone with the phone number provided in the next screen.

Automated Web Activation

When Automated Web Activation is selected the screen below will be shown:

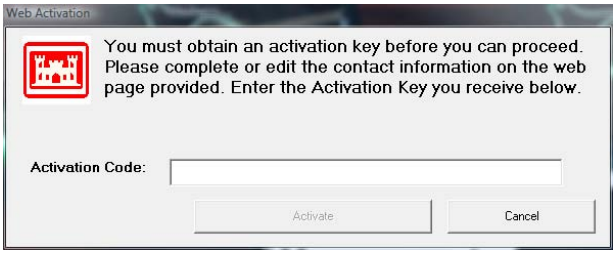

Automatic Activation
To activate your software online, please enter or update your contact information below. Your correct EMail address is important to receive notification of PAVER updates. Press "Activate" when you are finished.
PAVER Serial Number: 1 2 3 - 4 5 6 7 - 8 9 0 1
Agency/Company Name: *
Contact Name: *
City:
State:
Country:
EMail Address: *
Confirm EMail Address: *
Secondary EMail:
Phone:
* Required
Activate PAVER Online
Cancel
Previously entered serial number

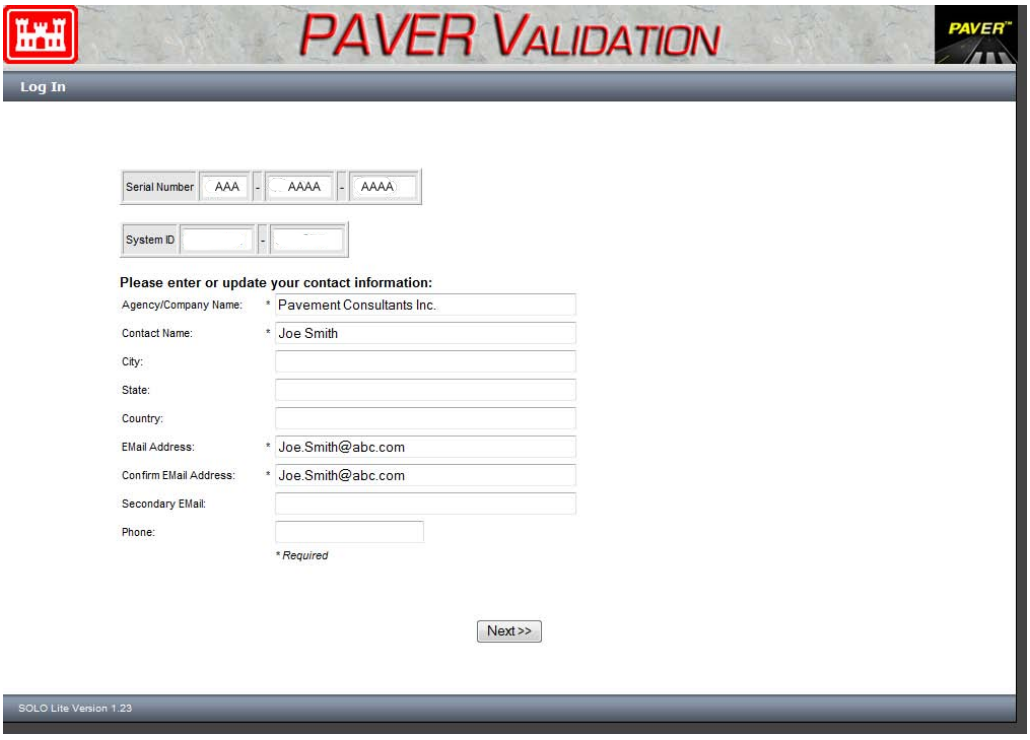
Fields marked by an asterisk are required, all other fields are optional. Once all required fields are populated, click the "Activate PAVER Online" button to complete the activation process.


Automatic Activation
To activate your software online, please enter or update your contact information below. Your correct EMail address is important to receive notification of PAVER updates. Press "Activate" when you are finished.
PAVER Serial Number: 1 2 3 - 4 5 6 7 - 8 9 0 1
Agency/Company Name: * Pavement Consultants Inc.
Contact Name: * Joe Smith
City: Fort Collins
State: CO
Country: USA
EMail Address: * jsmith@abc.com
Confirm EMail Address: * jsmith@abc.com
Secondary EMail: joe_smith@abc.com
Phone: 555-555-5555
* Required
Activate PAVER Online
Cancel

Manual Web Activation

When Manual Web Activation is selected, the following screen will open, along with a webpage where required information needs to be entered. The System ID information will be automatically populated.

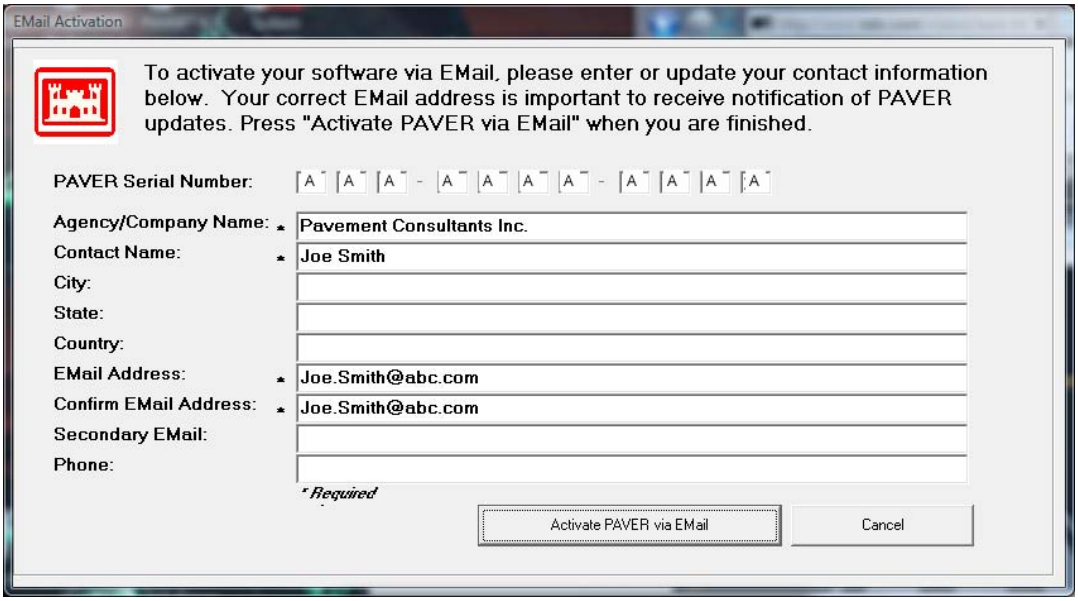

Web Activation
You must obtain an activation key before you can proceed. Please complete or edit the contact information on the web page provided. Enter the Activation Key you receive below.
Activation Code:
Activate
Cancel



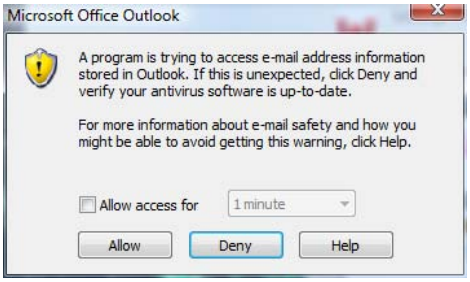
Once required information is entered, the Next button on the bottom of the webpage will be activated. Click on the Next button to receive the activation number. Enter the activation number on the Web Activation form.

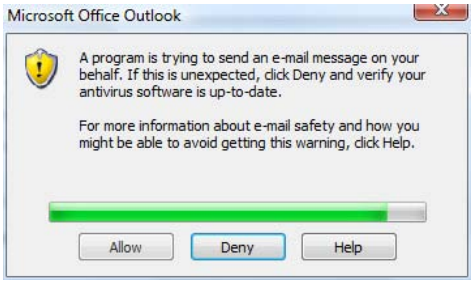
Email Activation

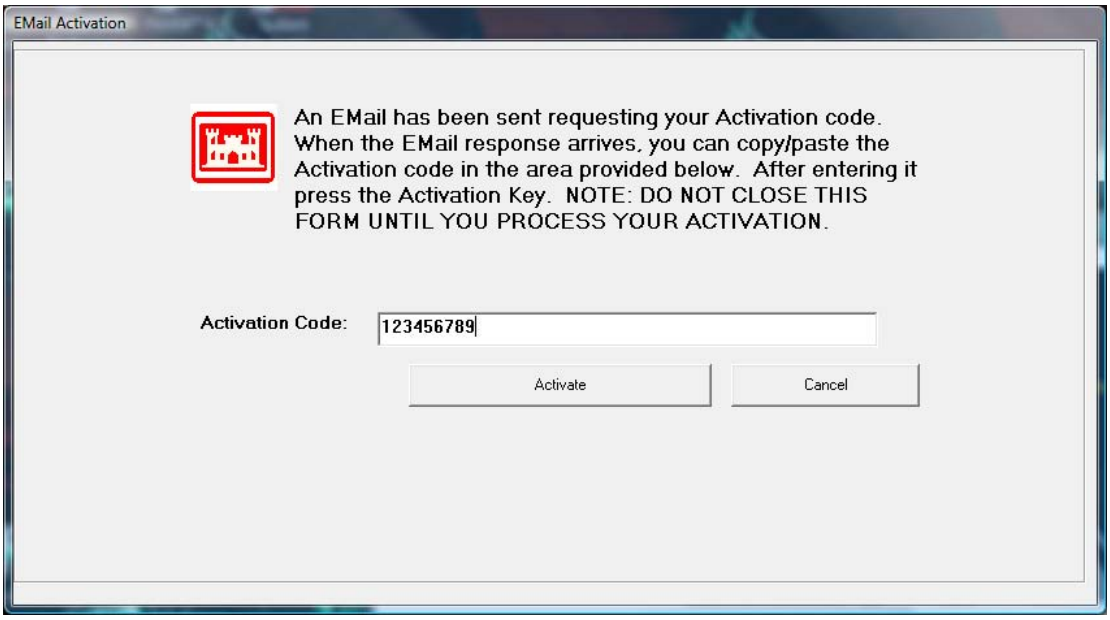
When activating PAVER™ via Email, first enter the required information in the image below.



After clicking Activate PAVER™ via Email, PAVER™ will automatically use your email application to send an email to the licensing server, which will send an email reply containing the activation code. Enter the activation code from the reply email and click Activate.


Microsoft Office Outlook
A program is trying to access e-mail address information stored in Outlook. If this is unexpected, click Deny and verify your antivirus software is up-to-date.
For more information about e-mail safety and how you might be able to avoid getting this warning, click Help.
Allow access for
1 minute
Allow
Deny
Help

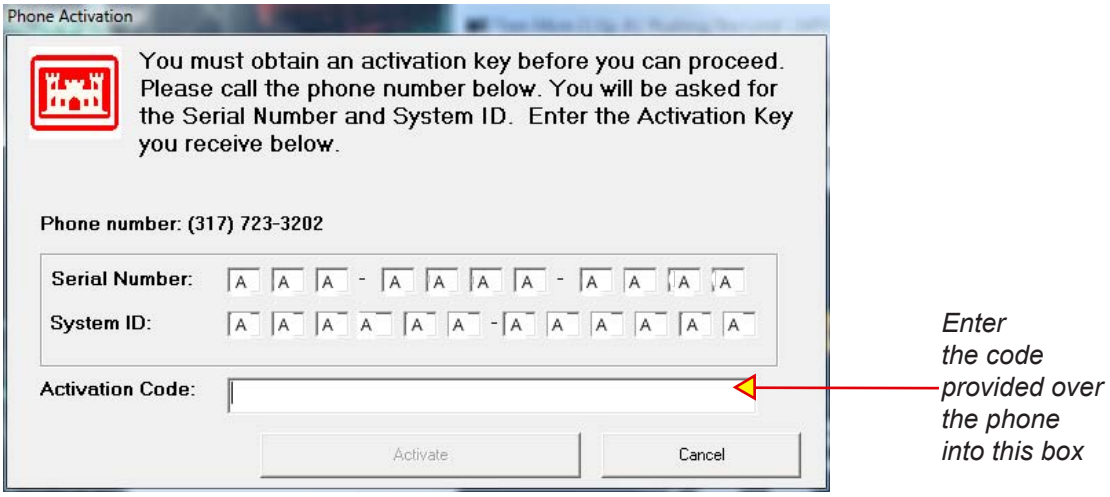

Microsoft Office Outlook
A program is trying to send an e-mail message on your behalf. If this is unexpected, click Deny and verify your antivirus software is up-to-date.
For more information about e-mail safety and how you might be able to avoid getting this warning, click Help.
Allow
Deny
Help


EMail Activation
An EMail has been sent requesting your Activation code. When the EMail response arrives, you can copy/paste the Activation code in the area provided below. After entering it press the Activation Key. NOTE: DO NOT CLOSE THIS FORM UNTIL YOU PROCESS YOUR ACTIVATION.
Activation Code:
123456789
Activate
Cancel

Phone Activation

When activating PAVER™ over the phone:

- The serial number will be populated automatically from the first activation screen.
- The system ID will be populated automatically from your computer.
- Call the number shown on the screen and provide the serial number and system ID shown to receive an activation code to enter in the "Activation Code" box.
- Once the activation code has been entered, select "Activate" to activate your copy of PAVER™.

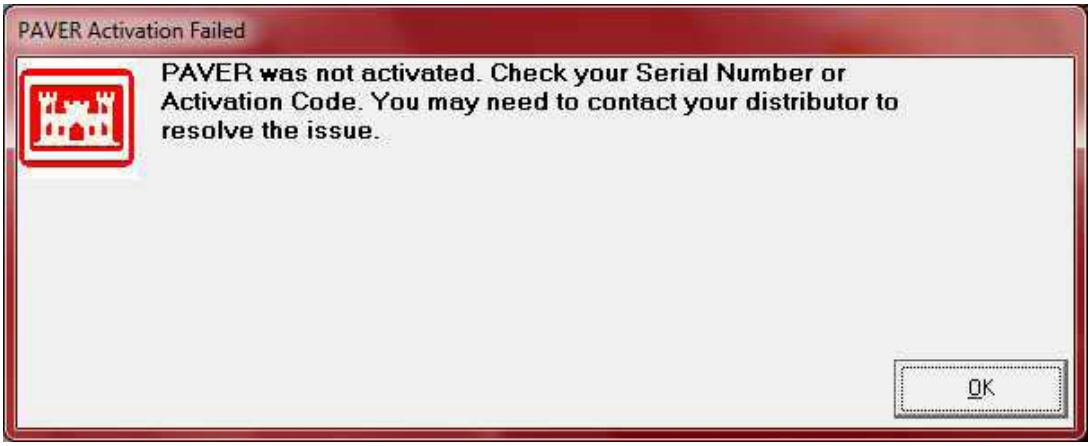

Phone Activation
You must obtain an activation key before you can proceed. Please call the phone number below. You will be asked for the Serial Number and System ID. Enter the Activation Key you receive below.
Phone number: (317) 723-3202
Serial Number:
System ID:
Activation Code:
Activate
Cancel
Enter the code provided over the phone into this box

Activation Complete

If a valid activation code has been entered the screen below will be shown indicating that PAVER™ has been activated and is now ready for use.

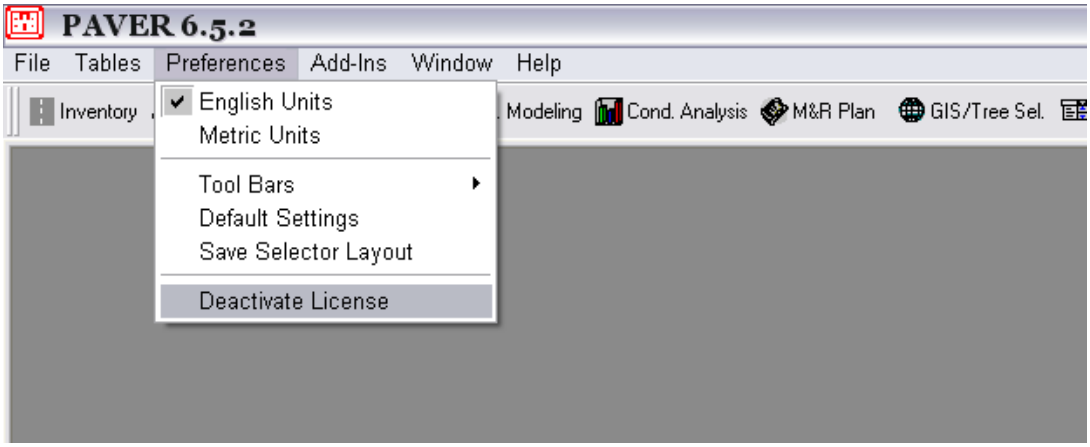
Activation Failed

If an invalid activation code has been entered the screen below will be shown indicating that PAVER™ has not been activated and further steps are required to successfully activate your software.


PAVER Activation Failed
PAVER was not activated. Check your Serial Number or Activation Code. You may need to contact your distributor to resolve the issue.
OK

Deactivate a License

To deactivate PAVER™ open the program and select Deactivate License under the Preferences drop down menu.



The deactivation screen will appear with the serial number currently in use. Click the Automated Web Deactivation button.

PAVER License De-activation
Deactivate will release the license held by this copy of PAVER. This will allow the use of this Serial Number on another PAVER install.
Serial number from your copy of PAVER:
C 6 0 - 1 5 E 0 - 2 8 7 1
Automated Web De-activation
Cancel

Important Note
Deactivation quantity is dependent upon PAVER product type (Academic, Demo, etc.)

After PAVER™ is deactivated you can install the software on a different computer. Deactivation quantity is dependent upon PAVER™ product type (Academic, Demo, etc.).

PAVER™ 6.5

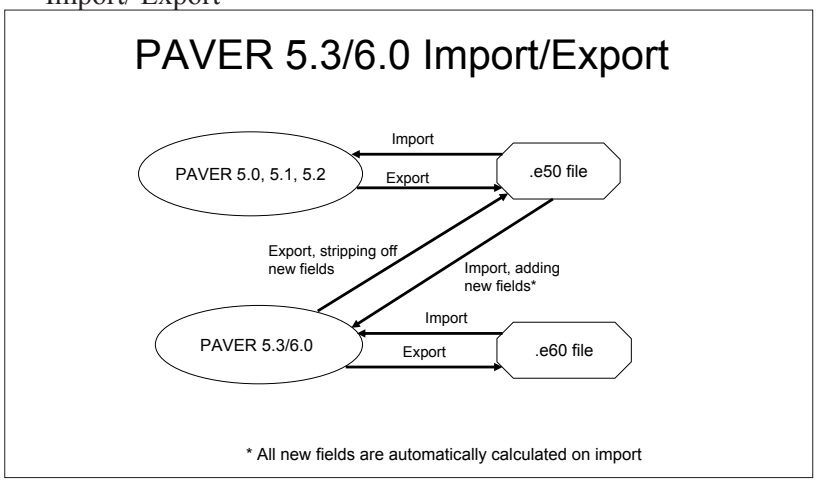
Introduction To PAVER™

PAVER™ 6 for Windows is an automated pavement management system (PMS). It is a decision making tool for the development of cost effective maintenance and repair alternatives for roads and streets, parking lots, and airfields. PAVER™ provides you with many important capabilities, including:

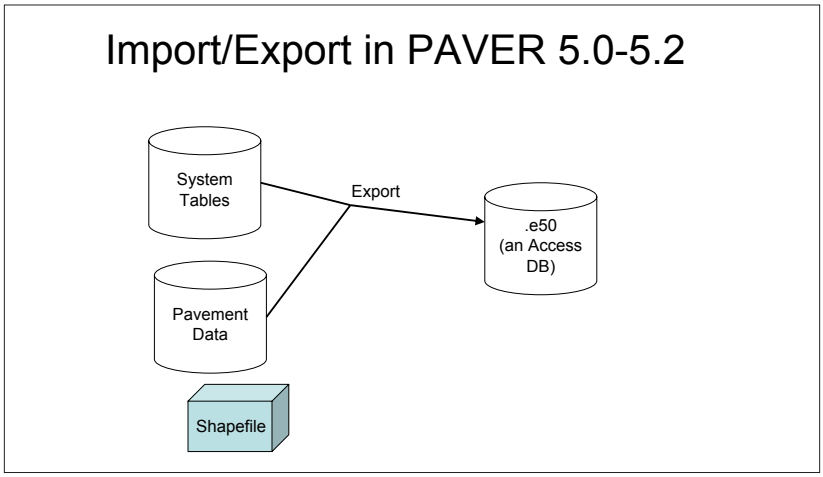
- Pavement network inventory
- Pavement condition rating
- Development of pavement condition deterioration models (Family Curves)
- Determination of present and future pavement condition (Condition Analysis)
- Determination of maintenance and repair (M&R) needs and analyzing the consequence of different budget scenarios (Work Planning)
- Project Formulation

PAVER™ 6 Improvements/ New Features

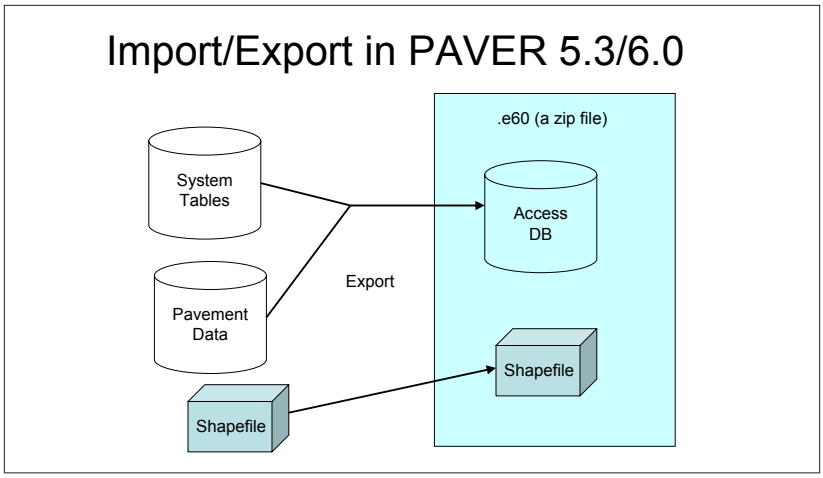
- Import/ Export



*PAVER™ 6 supports the import/export of *.e50 files from PAVER™ 5.0-5.2 as well as *.e60 files from PAVER™ 6, and *.e65 files from PAVER™ 6.5.*



*The *.e50 files of earlier PAVER™ versions consisted solely of Access database files.*

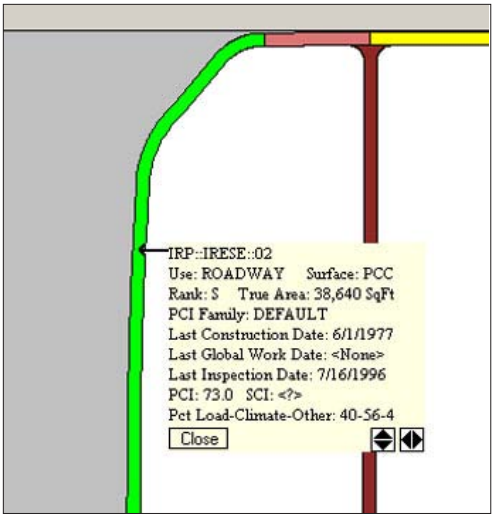


*The *.e60 & *.e65 files exported from PAVER™ 6 (and 5.3) are zip files that include an Access database file and related shapefiles.*

- Distress Unique Identifier: The 5.3/ 6 data structure includes a distress unique identifier, used to prevent the duplication of distress values when a database is split and recombined.
- GIS Assignment Tool: Easier to discern networks and branches with unassigned sections.
- Wizards
  - Inspection
  - Work
  - Last Construction Date
  - Inventory Properties
- Work Plan
  - M&R Families
  - Credit for Preventative
  - Delay Costs
  - Project Planning
- Virtual Inventory
- User-defined Views
- Miscellaneous
  - Surface Change After Repair
  - Drop-Down List Option in Additional User Fields
  - Inspection Scheduling with Cost

- PAVER™ 6 GIS Identification Tool: The GIS Identification Tool allows a user to view important information about a section by right-clicking on any defined section within a GIS view. A pop-up window opens to display: Pavement ID, Rank, True Area, Assigned PCI family, Last Construction Date, Last Inspection Date, PCI, SCI, ACN/PCN, and Percent Deduct Value due to Load/Climate/Other. This feature gives users an effective way to quickly answer questions about a section and provides useful information for project development.

Note
The eleven buttons on the PAVER™ Button Bar are arranged to reflect the logical sequence of pavement management.



- Create New PAVER™ Table From A Shapefile: See Chapter 4 Database Tools << Create PAVER™ Inventory From Shape Data, in the PAVER™ 6.5 User Manual.

- New distresses added to comply with ASTM D5340-10 and D6433-09, both published in ASTM Volume 04.03, 2010.

Use	Surface Type	Old Distress	New Distress	Deduct Curve
Airfield	AC	52 Weathering & Raveling	52 Raveling	No Change
			57 Weathering	New
	PCC	70 Scaling (included ASR)	70 Scaling	New
			76 ASR	New
Roadway	AC	19 Weathering & Raveling	19 Raveling	Same, but no low severity
			20 Weathering	New

- PCASE/ PAVER™ Compatibility. PCASE is the Pavement-Transportation Computer Assisted Structural Engineering software that is used for the design and evaluation of transportation systems (airfield, roads, and railroads). It uses empirical or layered elastic methodology for pavement design. The software supports data from dynamic cone penetrometer and non-destructive testing using falling weight deflectometer for pavement evaluation.

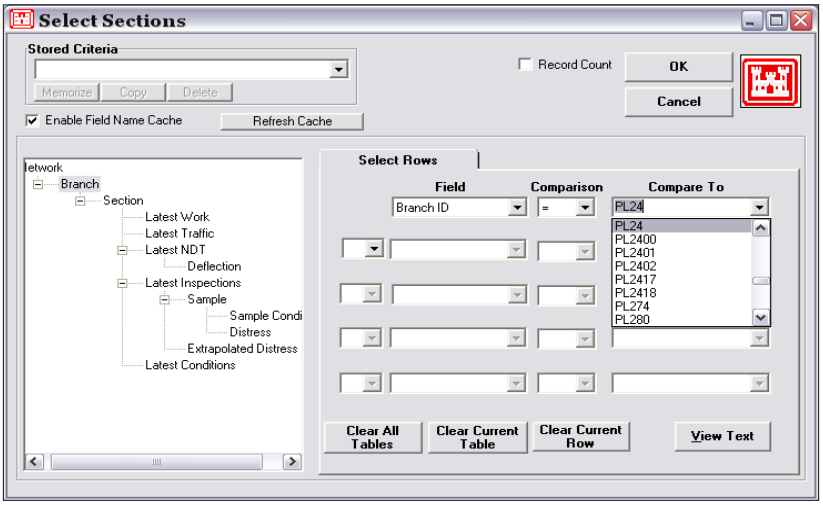
Currently, PCASE 2.09.01 is compatible with PAVER™ versions 5.3.7 through 6.5.2

PAVER 6.5.2; PCASE 2.09
File Tables Preferences Add-Ins Window Help
Inventory Work PCI Reports Pred. Modeling Cond. Analysis M&R Plan GIS/Tree Sel. List Sel. Wizards Visual Menu Help About PAVER
Traffic Design Evaluation DCP Climate NDT Data Core Reports Vehicle Edit Help / Utilities GIS Reports GIS/Tree Sel. GIS Assignment Tool

What's New in Version 6.5.2

PAVER™ 6.5.2 improvements include:

- Licensing deactivation is available once for each activation.
- The query tool has been changed to accommodate large databases. In the Compare To field, when the available items exceeds 1000, the first few characters can be typed in the box to narrow down the number of choices populated.



New Default Branch Uses:

- Airfield:
  - OVERRUN
  - SHOULDER
  - BLAST PAD
- Roadway and Parking:
  - DRIVEWAY

New Default Work Types:

- Localized Preventive M&R:
  - Spread Sand or Gravel, Code "SS-SG"
  - Patching-Infrared, Code "PA-IR"
  - Cold Milling-Localized, Code "CM-LO"

- Major M&R:
  - Cold Mill and Overlay, Code “MOL”
  - Cold Mill and Overlay- 2 inches, Code “MOL-2”
  - Cold Mill and Overlay- 3 inches, Code “MOL-3”
  - Cold Mill and Overlay- 4 inches, Code “MOL-4”
- Layer Construction:
  - Cold Mill - 2 inches, Code “CM-2i”
  - Cold Mill - 3 inches, Code “CM-3i”
  - Cold Mill - 4 inches, Code “CM-4i”

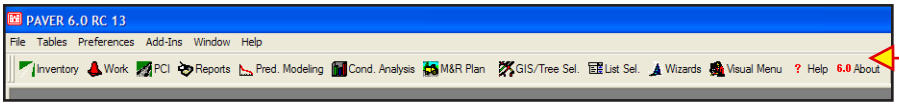
Organization

The main features of PAVER™ are accessible from eleven buttons arrayed across the top of the PAVER™ Desktop. The button array, referred to as the PAVER™ Button Bar, is arranged to reflect the logical sequence of pavement management, and initiates the most frequently used features in PAVER™. By clicking one of the buttons, you launch one of ten principal PAVER™ components:

- Inventory Data (Inventory): Inventory data entry and summary charts
- Work Information (Work): Work required and work history
- PCI Inspections (PCI): Field inspection data entry
- Reports: PAVER™ reports and summary charts
- Prediction Models (Prediction Modeling): Build and assign condition prediction models
- Condition Analysis: Condition analysis report
- M&R Plan: Maintenance and repair planning report
- GIS/Tree Selection Tool: Pavement selector using GIS
- List Selection: Pavement selector using pull-down lists
- Wizards: Step-by-step guide to aid in basic PAVER™ functions
  - Inspection data entry
  - Work entry
  - Last construction date
  - Inventory properties.
- Visual Menu: A detailed menu with all PAVER™ options

Like other Windows programs, additional program features are accessed from the drop-down menus located above the PAVER™ Button Bar. The PAVER™ Menu provides standard Windows features such as file and print services (File New, File Open, File Combine/Split, Print, Printer Setup and Exit), editing (Cut, Copy and Paste), and Windows management and help.

The PAVER™ Menu also provides specialized PAVER™ options for accessing and editing system tables (Tables) as well as changing the units of measure from English to metric (Preferences).


PAVER 6.0 RC 13
File Tables Preferences Add-Ins Window Help
Inventory Work PCI Reports Pred. Modeling Cond. Analysis M&R Plan GIS/Tree Sel. List Sel. Wizards Visual Menu Help 6.0 About
PAVER™
Button Bar

2 User Interface

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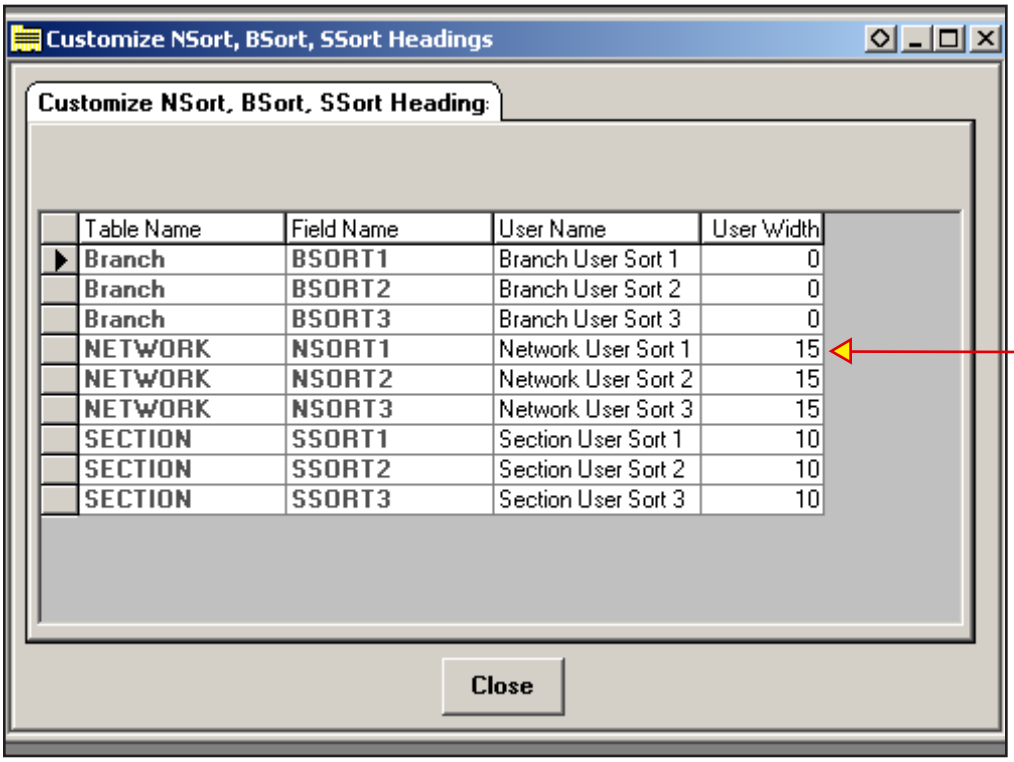
Basics

The PAVER™ program is designed using commercial Windows components and the user interface follows standard Windows protocols. Familiarity with basic Windows user skills is assumed in the design of the program, the preparation of program documentation, and the design of the help system.

Spreadsheet Forms

The basic form for editing and viewing data in PAVER™ is a table that operates like a spreadsheet. In some instances, these forms are used only to present data and the values displayed cannot be edited. On other occasions, you are able to edit the data or add new lines to the table.

As with other tools, highlighting the spreadsheet and right-clicking reveals a menu with spreadsheet tools. Depending on the context, some of the right-button click features may not be available, and are consequently listed in the menu as light gray. The basic right-button click spreadsheet features allow table zoom, table layout customizing, add/edit/delete record, search, import/export, print table, and graph options.


Customize NSort, BSort, SSort Headings
Customize NSort, BSort, SSort Heading
Table Name
Field Name
User Name
User Width
Branch BSORT1 Branch User Sort 1 0
Branch BSORT2 Branch User Sort 2 0
Branch BSORT3 Branch User Sort 3 0
NETWORK NSORT1 Network User Sort 1 15
NETWORK NSORT2 Network User Sort 2 15
NETWORK NSORT3 Network User Sort 3 15
SECTION SSORT1 Section User Sort 1 10
SECTION SSORT2 Section User Sort 2 10
SECTION SSORT3 Section User Sort 3 10
Close
Spreadsheet form

Index Cards

Index-style data entry windows are used in several forms by PAVER™: Inventory, Prediction Modeling, Condition Analysis, M&R Planning, and EMS™ Query. The index-style windows place data entry fields on multiple forms that look and operate like paper index cards, and allow the user to switch between multiple cards without opening or closing additional windows.

When a window containing index-style data cards first opens, the form's initial active index card is visible and can be edited. Each index card form includes a tab with a descriptive title, and only this tab portion of unselected index cards is visible.

To change the active index card, use the mouse to point to an inactive index card title and left-click. The selected card becomes the active card and the previously active card becomes inactive. You can now edit or add entries to the fields on the active index card. After editing is complete, click the close button on the form or use the Windows close form menu. Your data is saved to the database in real-time as you make your edits. This means there is no action required to save your changes.

Note
Changes made on the index data cards are made real-time. PAVER™ automatically saves any changes the user makes.

Tab Tables

PAVER™ Tab Tables are spreadsheet-like tables used in PAVER™ to display and edit system configuration information. The Tab Tables are accessed from the Tables menu option, and look and operate like spreadsheets. Right-button click features are used to print, zoom and configure the tables, and buttons on the bottom of the tab form are used to add and delete records.

There are two types of Tab Tables, basic (independent) and linked (dependent). The basic table operates like a standard spreadsheet except that data input into the table is controlled by the series of buttons (Close, Add and Delete) that are arrayed along the bottom of the Tab Table forms. Clicking the Add button inserts a new record into the table, which can then be edited. The Delete button removes the highlighted record in the table, and the mouse or arrow keys are used to move up and down the rows and across columns in the active Tab Table.

The second type of Tab Table is a linked table. The linked table uses the records of a basic table or tables as the basis for its data entry. The linked table is referred to as the child, or dependent table, and the basic table is the parent (independent) table. For example, the work type cost table uses three work type tables: localized, global and major as the basis for its entries. Therefore, when you add a record to the work type cost table (a linked table), you click the Add button and get a picklist of possible values to add. The table is formed from the entries in the linked table's parent table(s) (localized, global, and major M&R tables in this case).

Linked tables help PAVER™ enforce consistency in its data tables. For example, if the work type cost table was not linked to the M&R tables, it would be possible to develop costs for M&R procedures that were not defined. This type of inconsistency can damage the accuracy of analysis routines such as the Work Plan.

Printing Screen Images

Printing in PAVER™ is accomplished in one of three ways. First, the standard PAVER™ reports include specialized forms for printing reports (see the Standard Reports section). Right-button clicking on tables or graphs provides a method of printing tables or graphs. In certain situations, you may wish to print the contents of a screen as it appears, which can include multiple tables, graphs or other data entry forms. To print the image on your screen, select File from the menu and then Print. In some instances you will note that the Print option is not available to select from the File submenu, indicating that there is currently no printable object on the PAVER™ Desktop.

After selecting Print, the print dialog box appears on your screen containing a drop-down list box labeled Print What. Open the drop-down list and select Form Image, then select the OK button to send a copy of the active PAVER™ window to the printer. You may use the Printer Setup dialog window to select an alternate printer if you have access to multiple printers. After you have printed the form image, the print dialog window closes and you return to the PAVER™ window that was active when you selected the Print option.

Graphs in PAVER™ can be printed in either black and white or color. The default setting in PAVER™ is black and white printing for graphs. To choose color printing, right-button click on the graph and select Toolbar, then on the toolbar select the System button. Under Printing, change the selection from Mono to Color and click OK.

Note
Each time that you wish to print a graph in color, you must select colors using the System button on the graph Toolbar.

Units Of Measurement

To change units from English to metric, select Preferences on the menu, and then select Metric Units. Rounding error is not introduced into stored data values if repeated changes between English and metric units occur, because all measurement values in PAVER™ are stored as metric values. Changing the setting in Preferences changes the filters that are used for presenting data on PAVER™ screens and reports. To ensure that the display properly reflects the unit change, it is best to close all data entry and report screens before switching preferences.

Adjusting Table And Graph Sizes

Tables and graphs automatically resize to the available space on your computer display. As the number of active tables increases, the number of lines allocated to each table reduces. If a table is associated with a graph, the table and the graph share the horizontal space that is allocated to the table. You can adjust the space allocated between a table and its associated graph by pointing to the vertical bar that separates a table from its graph and then, while pressing the left mouse button, drag the separator bar to the right or left. You cannot manually increase or reduce the vertical space allocated to a table in the Report Viewer. If you want to increase the vertical space available for a table you must close one of the other Report Viewer tables. You may use the zoom function on active tables with the right-button click tool for a temporary larger presentation of a table or a graph.

Right-button Click

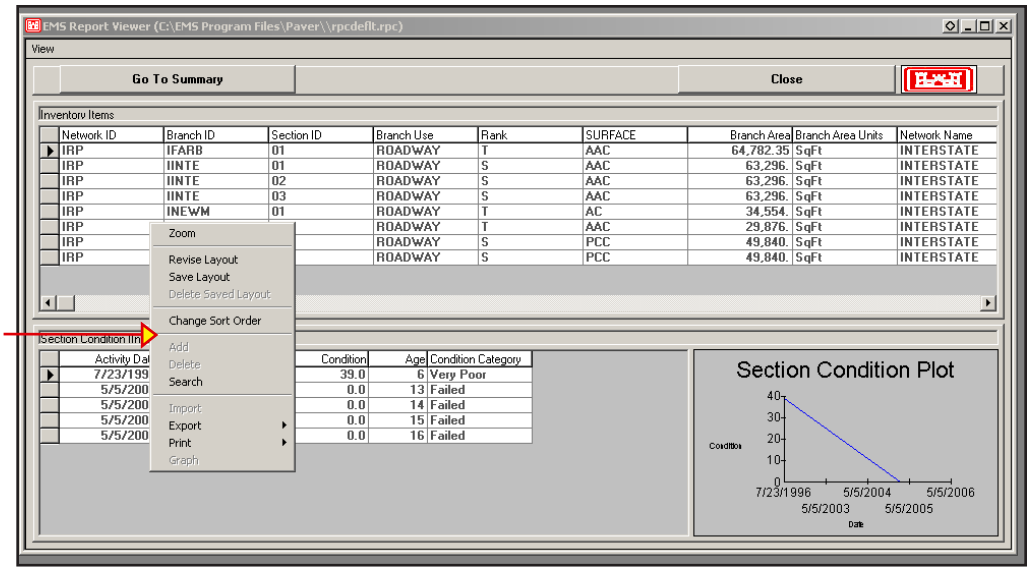
Right-button Click On Tables

Whenever possible, information in PAVER™ is presented in tables. These tables are used to input, edit, and review reports (EMS™ Report Viewer and Reports). The tables in PAVER™ are equipped with several features that enhance the capabilities of the PAVER™ system. These features include:

- Table printing
- Exporting the table to Excel
- Changing the formatting of the table
- Zooming in on the table
- Adding or removing fields
- Sorting the table

To access the extended table features you must first make the spreadsheet table active by clicking on the table. Once the table is active and the mouse pointer is over any portion of the table, right-click to invoke the menu of extended table features.

Right-button click menu

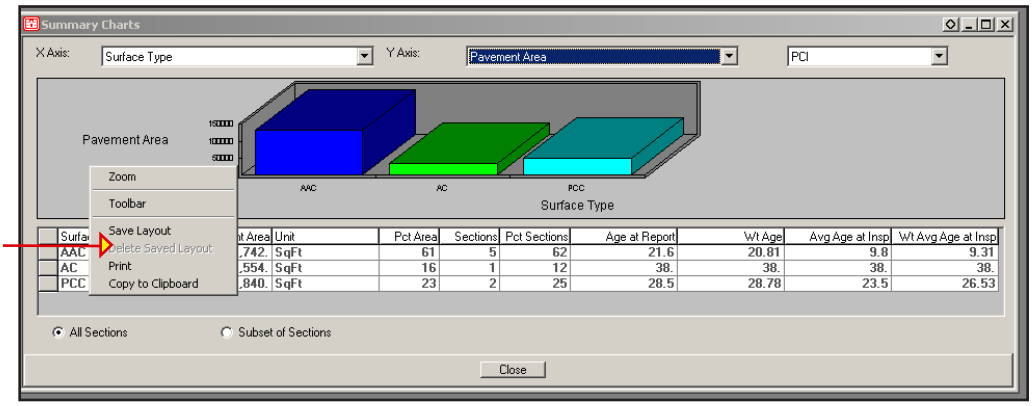


In addition to the right-button click table features, column widths can be reduced or enlarged when a table is active. To change column width, point to the vertical line positioned between the columns. When the mouse pointing indicator changes from the large arrow to the small double arrow icon, click and drag the column border to the desired size.

Right-button Click On Graphs

PAVER™ graphs can be printed, customized and zoomed in the same manner as PAVER™ tables. To view a PAVER™ graph, make the graph active by clicking on the graph. While the graph is active and the mouse pointer is anywhere on the graph, right-click to invoke the graph menu. Select items from the graph feature menu, which is accessible with a right-button click.

Right-button click menu



You can customize the look of PAVER™ graphs on the fly by using the EMS™ right-button click tools. The graph Zoom feature enlarges the graph to the full extent of the window in which the graph is located. From the zoomed graph window, you can copy the graph to the clipboard to later paste into spreadsheets, presentation programs, or other Windows applications. To return to the original window, right-click on the zoomed graph and select Unzoom.

Toolbar invokes a graph editor (Graph Control) that allows you to customize graph type and presentation. For example, you may change the graph type from a two dimensional bar graph to a three-dimensional pie chart. The Save Layout feature saves the current graph configuration so that on subsequent visits to the current graph it will retain the graph properties you specify using the Toolbar. The final graph feature, Print, allows you to print your graph to a Windows printer.

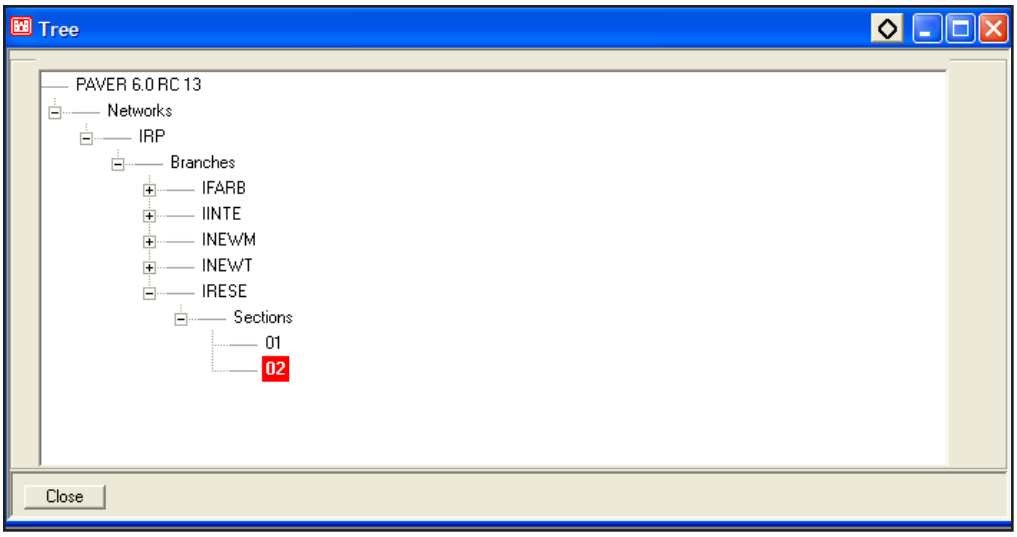
Advanced

Selectors

PAVER™ provides several options for choosing the portion of inventory with which the user wants to work. These "selectors" make moving from one part of the inventory to another quick and easy. The selectors are accessed directly from the Selection Buttons on the main toolbar or by going into the Visual Menu and choosing Selectors. Other parts of the program that require the user to specify a component of the inventory (i.e. Network, Branch, Section) respond to the input received from the selection tools. There are five selector types: Tree, Tab, GIS, List, and Tree/GIS.

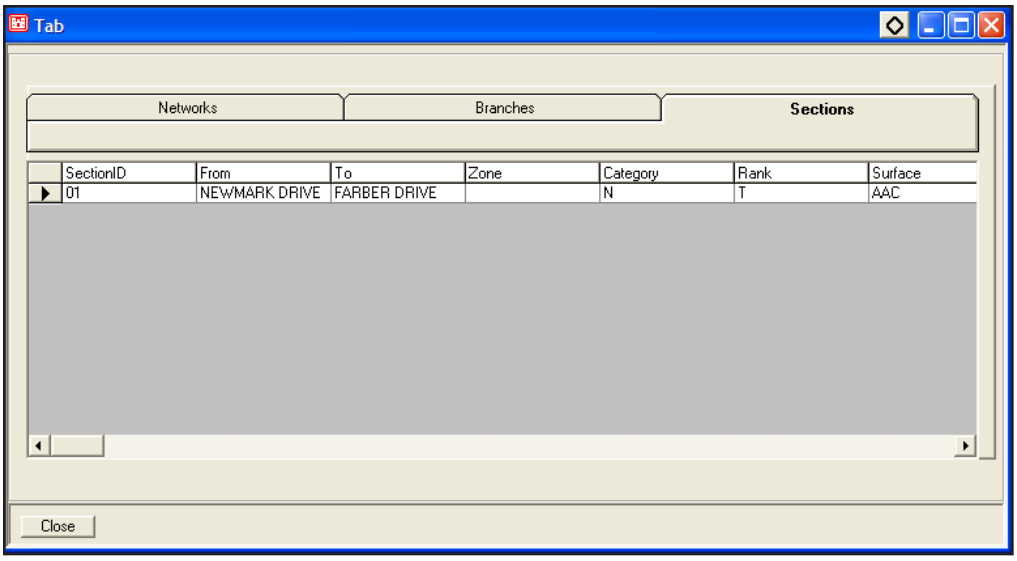
Tree Selector

Since the inventory in PAVER™ is represented in a hierarchy similar to the file structure in Windows, it is logical to navigate this structure in a tree format. Much like the Explorer tool in Windows, the Tree selector allows you to move through the hierarchy of your database and select the specific network, branch or section from which information is needed. This is done by moving down the "tree" until you arrive at the desired location.



Tab Selector

The Tab selector has a similar look and feel to the PAVER™ 4.2 method of selecting inventory items by selecting from the Network, Branch and Section file cards. Starting with the Network tab and working across to the Branch and Section tabs, the user can select and view data at any level of the inventory. Along with selection capability, all data contained at each level can be viewed directly from the same window the selection is made. Unique ID numbers and user-defined sort field data are also now available for viewing with this selector.



EMS™ Query Tool

The EMS™ Query Tool is utilized in several places within PAVER™ to facilitate the selection of a subset of pavement sections to use in reports and data modeling. The query tool can also be used to specify the sorting of data. Selection and sorting criteria specifications can be stored and retrieved by name in the Stored Criteria box. The query tool also reports the record count (number of sections selected) as filtering queries are built.

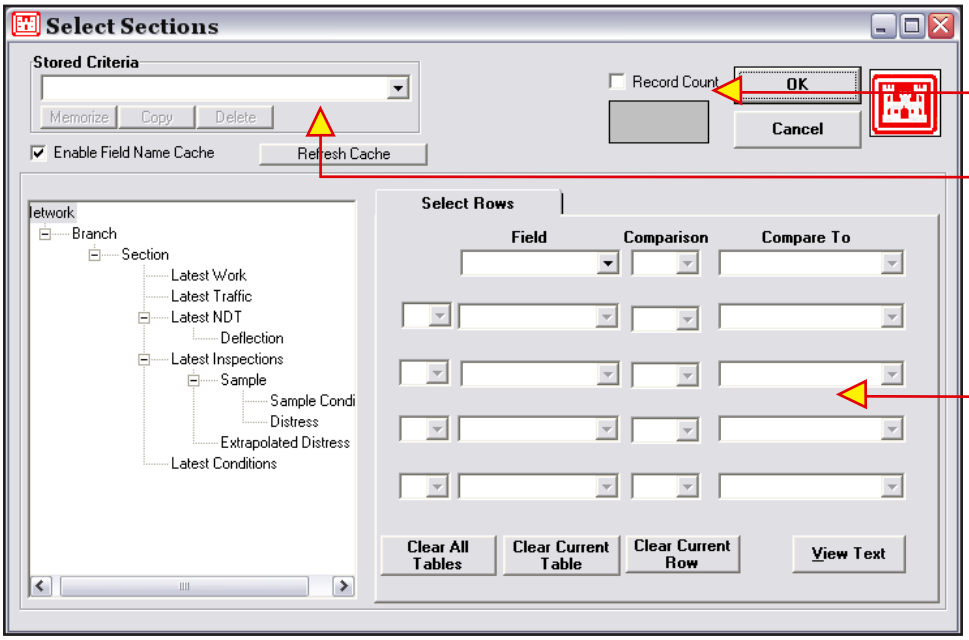
Note
Clicking the Record Count checkbox shows real-time updates of how many pavement sections are currently selected by the query tool.

Filter criteria are entered using the drop boxes arrayed across the query form. Fields are entered from left to right and top to bottom. As you enter query information, only the next field will be highlighted for user selection. For example, use the first entry in the Field column to select Surface. Once you have selected Surface, the Comparison field is highlighted. After selecting a query field and the comparison evaluator (=, >, <, >=, <=, <>), the Compare To field becomes active. The drop-down list on the Compare To field lists the available choices in the database for the selection you made in the Field column. If the number of avaliable choices is larger than 1000, the first couple of characters can be typed in the box to narrow down the number of items populated. After you make a selection in the Compare To field, the record count indicator will change as the query you are building is applied to the database in real-time.

The first column on the query form contains the query statement operators (And/ Or). These operators are used to join the individual query statements. To see the Structured Query Language (SQL) query that you have built with the query tool, click the View Text button at the bottom of the screen. The Clear All button removes all selection criteria on the screen. Click the Save button on the EMS™ Query Tool to save a set of report criteria.

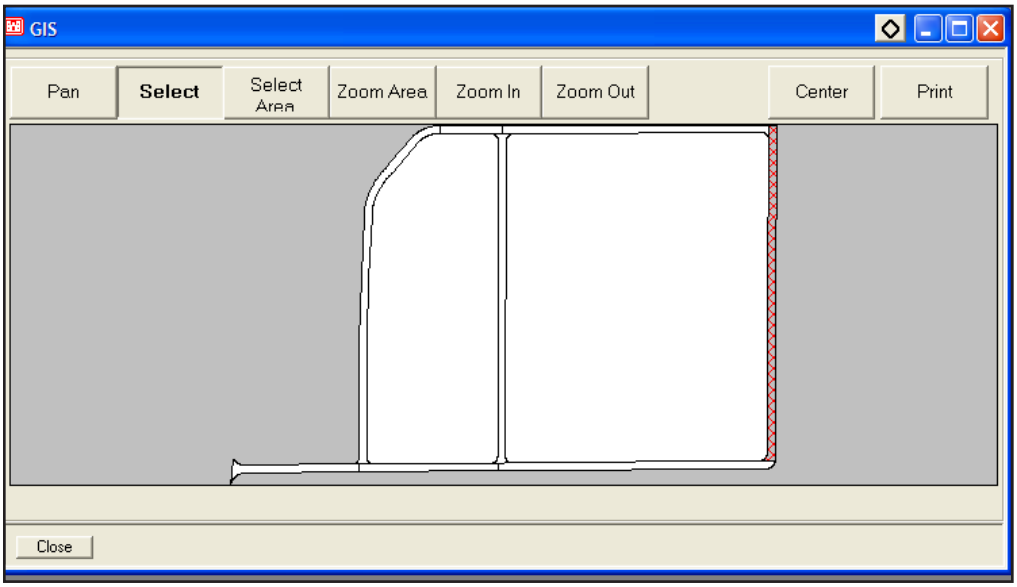
The And/ Or operators require additional clarification. For example, if the user wants to include pavement sections constructed with asphalt and concrete then the correct operator is Or, and the query will return any sections that fit either of the conditions. The And operator returns only sections that fit all of the listed conditions. For example, selecting asphalt surfaces and branch use equal to parking lots with the And operator returns only asphalt

parking lots. Using And with the first example will return nothing, since it is impossible for a section to be both asphalt and concrete surfaced.



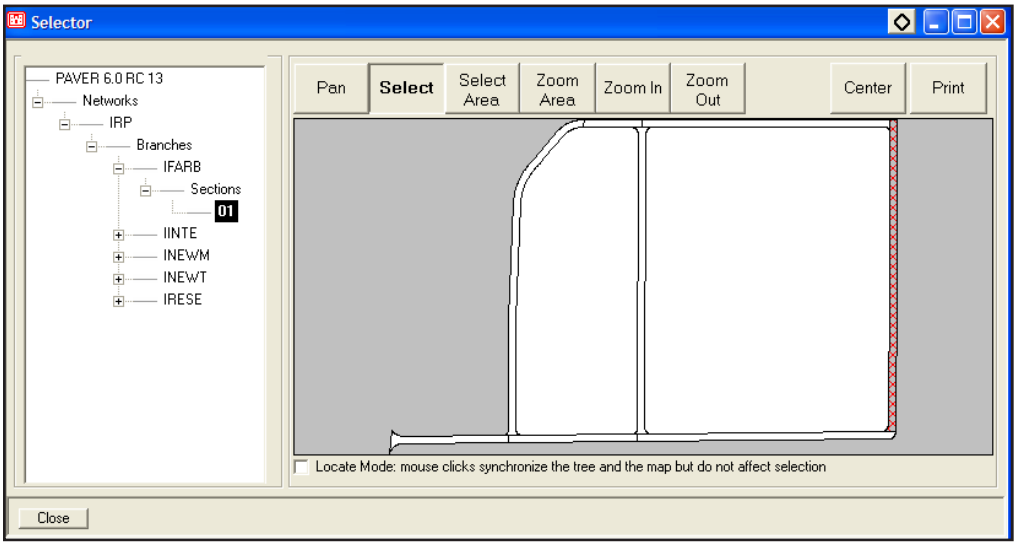
GIS Selector

Because GIS has become more integrated into PAVER™, the user can now select an inventory item using a GIS coverage. This first requires the database to be linked to a coverage via the PAVER™ GIS process. Once the GIS link has been completed, the map can be viewed via the GIS selector. By simply pointing and clicking on any polygon in the coverage, the selector makes the link to that section. Like the Tree selector, the GIS selector allows for selection but not the displaying of data.



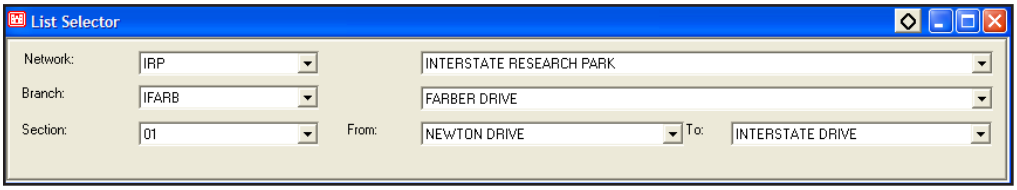
Tree/GIS Selector

The Tree/GIS selector is simply a combination of the Tree and GIS selectors displayed in one window. This allows the user to select an inventory item using the simplest method for that particular inventory item. For example, if you know only the location of the pavement, the GIS selector is most useful. If you need to trace through the hierarchy, the Tree selector is the logical choice. The Tree/GIS selector combines both of these features into one compact tool.



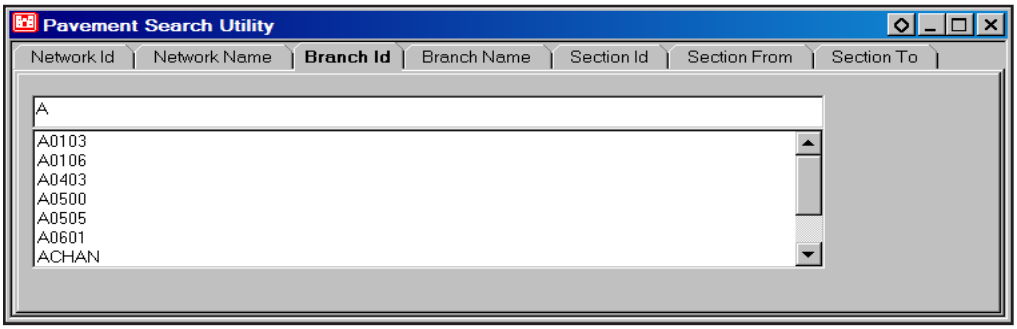
List Selector

This is the same selection tool used in Inventory management.



Search Selector

The last choice from the Selectors menu is the search selector. This tool can be used to search based on seven different categories.



EMS™ Report Viewer

The PAVER™ analysis reports (Condition Analysis Report and the M&R Report) are presented in the EMS™ Report Viewer, a tool that provides a framework for displaying multiple spreadsheet-like tables that contain report information. The spreadsheets in the Report Viewer can be associated with graphs that operate in conjunction with the spreadsheet tables. The Report Viewer organizes the presentation of report results in two basic views, the summary view and the detail view. The summary view includes high-level views of summarized report data. The detail version of the report includes section by section details that are covered in the summary version of the reports. To switch from between the summary and detail views, click on the Go to Detail/Summary button.

Note
When selecting and deselecting several different report views, AutoRefresh can be deselected so that PAVER™ won't redraw the graphs until the user re-selects the option.

Note
Although the View button appears gray, it is always active.

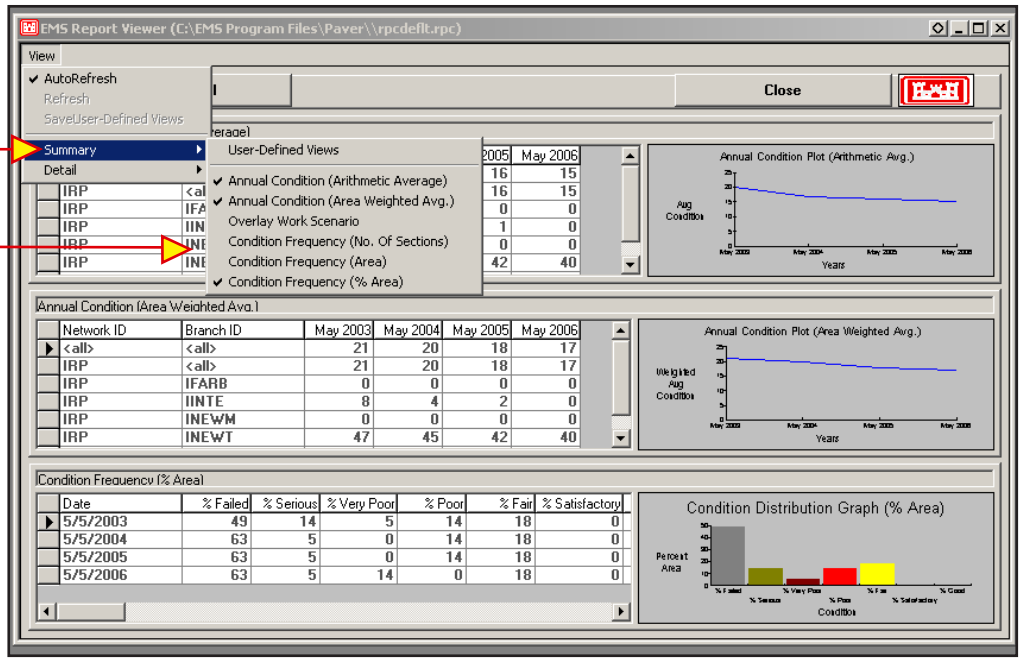
View Menu

The Report Viewer includes a View option that is used to open and close the various spreadsheet views of the report data. You may use the View in the Report Viewer window to configure the report viewer so that it presents only the information you wish to view. The default presentation of the Report Viewer is the summary version. To turn off one of the summary tables (and its associated graph), select View from the Report Viewer window, and then Summary. Select the table which you want to turn off. Tables or graphs which are active in the current report view have a check mark to the left of the table or graph name.

Within the Detail submenu, Plan Parameters opens a table displaying the parameters that were used to configure the current report. This is convenient for checking the settings requested when the user ran the report without having to exit and rerun the report.

View menu

Select tables and graphs to display



Report Viewer Tables

The spreadsheet tables in the report viewer are standard PAVER™ tables and support the right-button click on tables features. When an EMS™ Report Viewer report (i.e. Condition Analysis or M&R Work Plan) is displayed, the tables are made active with a left-click.

Spreadsheets in the Report Viewer can be associated with graphs. These graphs are implemented in two different ways. The first type associates a graph directly with a single row, the active or highlighted row, of the table. In this case, as the user changes the active row in the spreadsheet, the graph dynamically adjusts so that the graph reflects the active row in the spreadsheet.

The second type of graph association is as an overlay on an existing graph. For example, in the Condition Analysis Report a table showing combined section condition history and projections is linked to a graph that plots the condition over time. This graph can further be overlaid with a plot of the family curve assigned to the section. As elsewhere in the program, graphs in the Report Viewer can be zoomed, printed or configured with the right-button click on graphs feature.

Note
For more information about the EMS™ Image Viewer, see the Inventory section of this manual.

Exiting The Report Viewer

When you have completed reviewing a Report Viewer report, close the report by closing the Report Viewer window. After you close a report, you are prompted to save the report. If you choose to save the report, a file dialog box window is presented so that you can name the report to be saved.

*Note: Each report type has its own unique file extension: Condition analysis reports are *.rpc files and M&R Work Planning reports have *.rpw extensions. These extensions should be maintained when you name a report file.*

Note
You only need to replace the portion of the path that has changed in order to correctly modify the image path.

Edit Image Paths

The Edit Image Paths tool, now available under Inventory in the Visual Menu, gives users the ability to change the image path for images that are not stored in the database, but are stored in a remote location. The path to the image is stored in PAVER™ when images are not stored in the database. This tool allows the user to edit what image path is stored in the database.

To begin, launch the Edit Image Paths tool from the Visual Menu under Inventory. The image path can be adjusted for images stored at the Network, Branch, Section, and Inspection levels. All images stored at a specific level will be displayed in the table. To change the image path, first select the portion of the image path to be replaced in the What to replace box. The Shorten button shortens the path to be replaced one directory at a time. Once you have selected what to replace, select the new path in the Replace with box. The Browse button can be used to navigate to the new image location.

3 System Tables

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Define User Fields

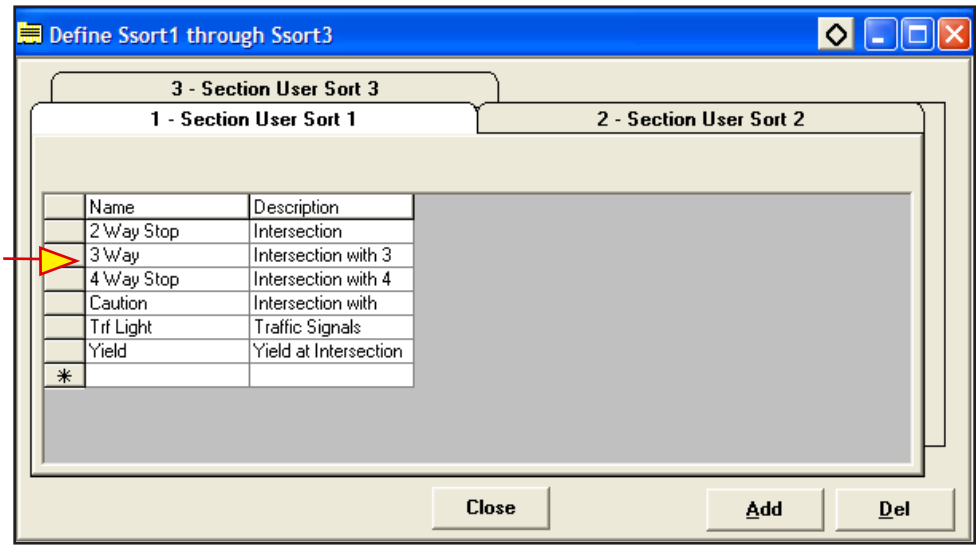
The PAVER™ system is designed so that you may assign user-defined fields to each level of the inventory (network, branch, and section.) The advantage of this capability is that PAVER™ allows you to sort the database at any level according to criteria that you have defined. This is helpful if you want to select certain networks, branches, or sections for reports or work plans. There are two types of user-defined fields: SORT Fields and Additional User Fields. SORT Fields are designed to be picklist fields, requiring the user to select from a predefined set of choices. Additional User Fields require the user to enter data.

NSORT, BSORT, And SSORT

At each level of the Inventory hierarchy (network, branch, and section), PAVER™ allows you to create three SORTs. Under the main menu, select Tables >> Define User Fields >> SORT for the desired level of inventory. Enter data by clicking on the field you wish to edit. The entries for Name should be short and easily recognizable since these will be displayed in PAVER™ as the options presented in the picklist for the SORT field. The Description entry should indicate the complete name. Click Add to add more entries for the sort, and click Delete to delete the selected entry. The selected entry is indicated by an arrow in the left margin. To assign criteria for the other two SORTs, click on their corresponding tabs.

Note
To change the default name given on a SORT tab, see Customize NSort, BSort, SSort Headings.

Sample entries for SSort by intersection type



Customize NSort, BSort, And SSort Headings

This window allows you to set the values for the User Name (the name displayed in PAVER™) and the User Width (the size of the field) for selected preset fields in PAVER™. The first two fields, Table Name and Field Name, are displayed in italics and cannot be edited.

Table Name and Field Name cannot be edited

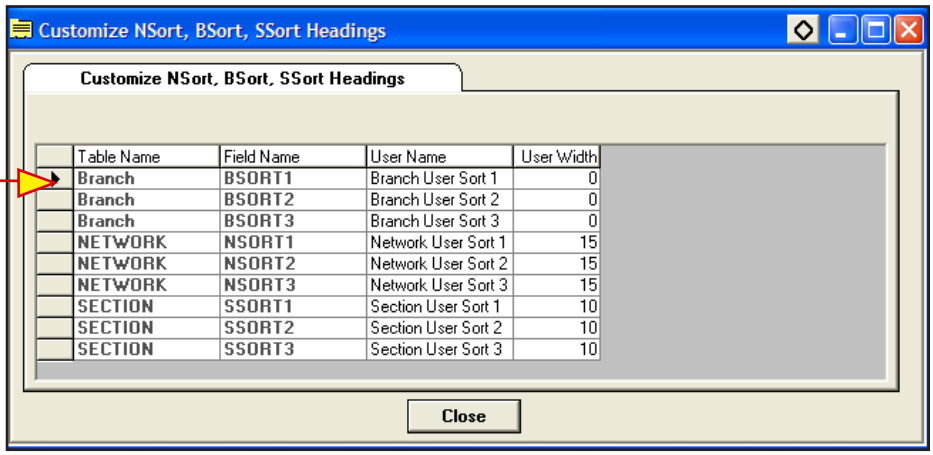


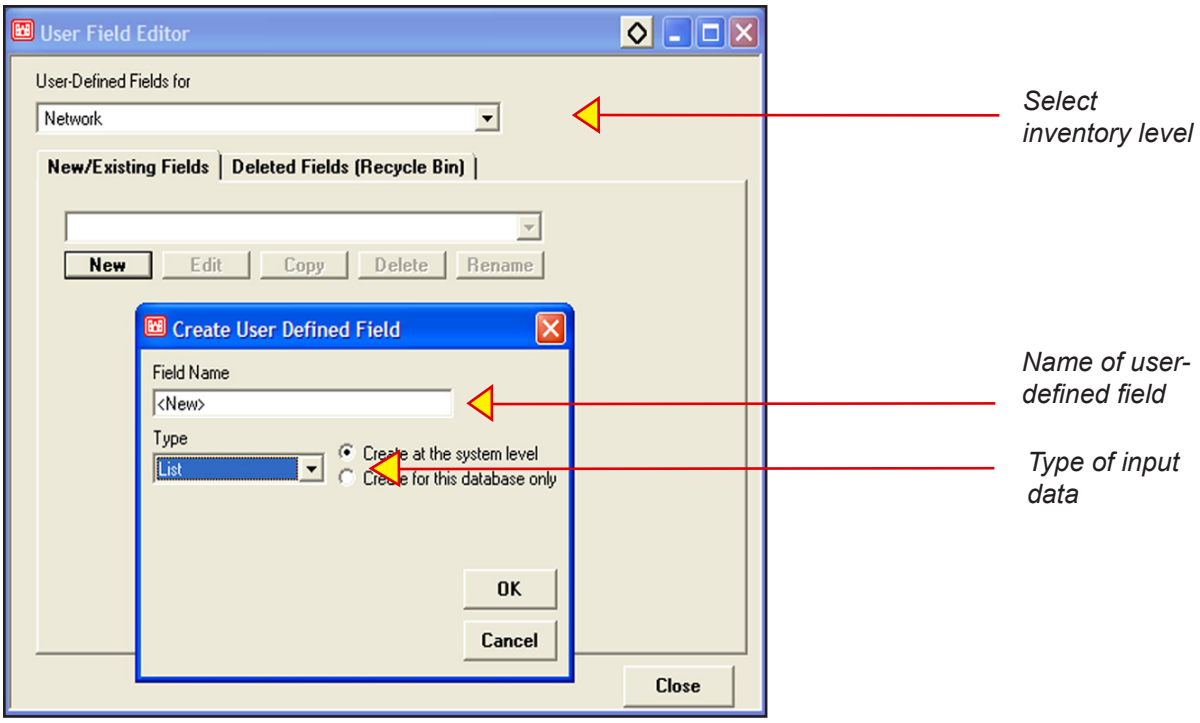
Table Name	Field Name	User Name	User Width
Branch	BSORT1	Branch User Sort 1	0
Branch	BSORT2	Branch User Sort 2	0
Branch	BSORT3	Branch User Sort 3	0
NETWORK	NSORT1	Network User Sort 1	15
NETWORK	NSORT2	Network User Sort 2	15
NETWORK	NSORT3	Network User Sort 3	15
SECTION	SSORT1	Section User Sort 1	10
SECTION	SSORT2	Section User Sort 2	10
SECTION	SSORT3	Section User Sort 3	10

Additional User Fields

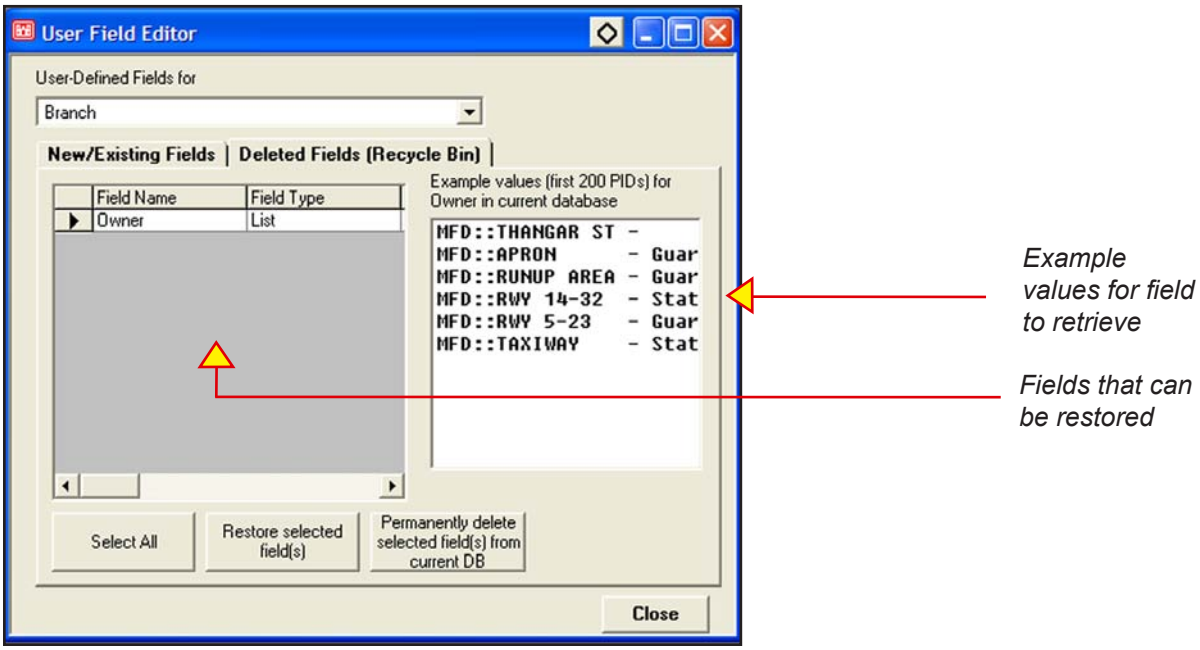
This section allows you to create user-defined fields in which you may enter data. From the PAVER™ main menu, select Tables >> Define User Fields >> Additional User Fields, to access the User Field Editor. On the New/ Existing Fields tab, the user can create a new field by first selecting the desired inventory level (network, branch, or section) and selecting new. Within the new window, the following information needs to be defined:

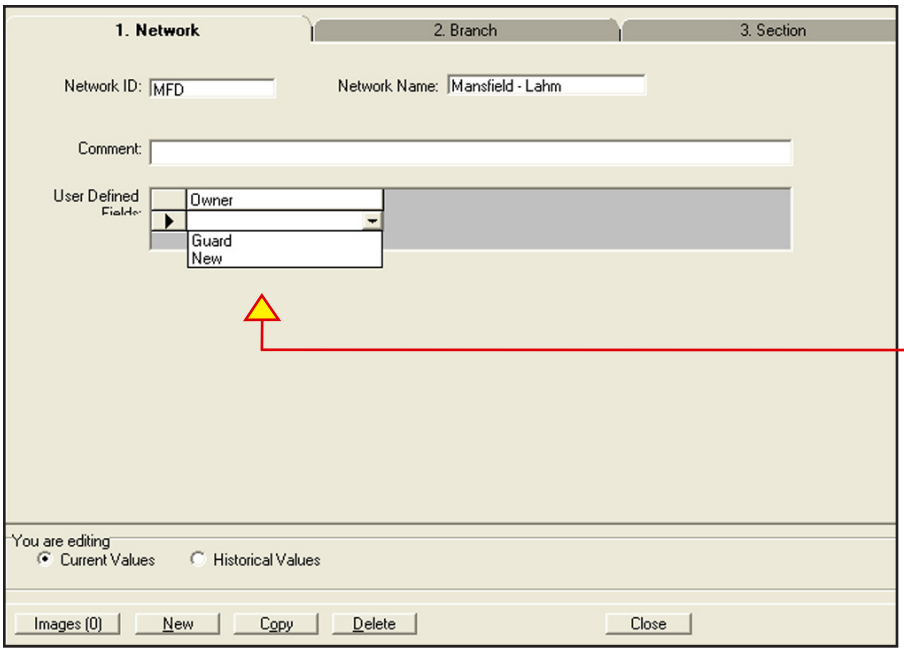
Note
The inventory form must be closed in order to run the User Field Editor.

- Field Name: The entry for this is displayed as the Additional User Field name when using this capability in PAVER™.
- Type: Designate what kind of data is to be put into the field: Yes/No, Currency, Date, Integer, Text, List, etc. When you use the Additional User Field in PAVER™, you are only able to enter data of the type you specify. To edit the type of an already existing entry, select it from the list of User Fields and click on Edit. To copy the field, click on Copy and assign a new name for the field. Delete deletes the selected field, and Rename allows you to edit the Field Name.
- Create at the System Level: This option will create the field in the system tables where it will appear in any database opened with the system.
- Create For This Database Only: This option will create the field only for the current database (the field will not be created in any other database).



Under the Deleted Fields (Recycle Bin) tab, the user has the ability to retrieve a deleted field. PAVER™ provides a list of fields that can be restored as well as example values for the selected field. The user can retrieve a field by selecting the field and clicking Restore Selected Field(s), or can alternatively Permanently Delete Selected Field(s) From Current Database.





Example created user-defined field

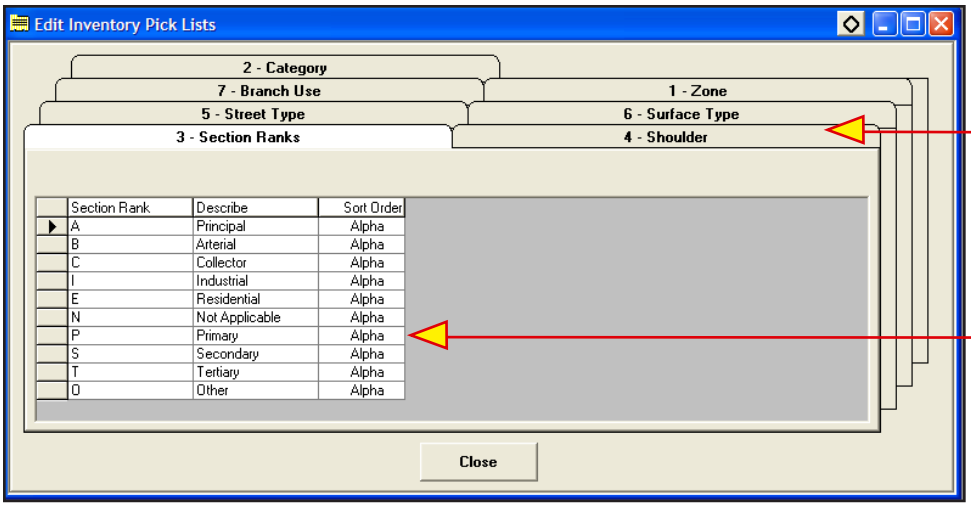
Edit Inventory Picklists

This window displays seven tabs that provide editing access to a group of picklists within PAVER™. All of these tabs allow you to add items to the current list. In some cases, existing table data is considered to be default and cannot be deleted. In most areas, PAVER™ will direct the process of data input to conform to the necessary PAVER™ database formatting. Some fields allow you to enter any text value, while other fields produce a prompt to the user to select an option from a list that is displayed. Examples of using this window are:

Note
On the Section Ranks tab, the user cannot add entries or edit the existing section rank names.

- Customizing Zone names
- Naming a new Surface Type
- Adjusting M&R priorities for different Rankings.

Clicking Add, adds a new record to the table. Before clicking Delete, first highlight the desired record by clicking on the box at the left of the record. PAVER™ asks you to confirm every Delete action.


Edit Inventory Pick Lists
2 - Category
7 - Branch Use
1 - Zone
5 - Street Type
6 - Surface Type
3 - Section Ranks
4 - Shoulder
Section Rank | Describe | Sort Order
A | Principal | Alpha
B | Arterial | Alpha
C | Collector | Alpha
I | Industrial | Alpha
E | Residential | Alpha
N | Not Applicable | Alpha
P | Primary | Alpha
S | Secondary | Alpha
T | Tertiary | Alpha
O | Other | Alpha
Close
To edit a picklist, click on a tab
Edit entries for Section Ranks picklist here

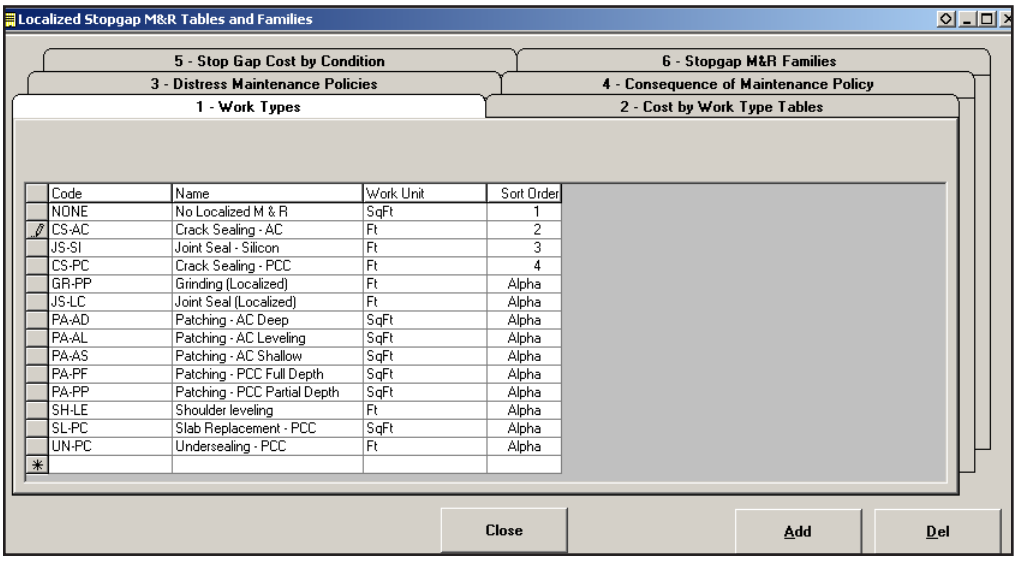
M&R Plan Tables And Families

All tables found under this category are tables that PAVER™ uses when executing the M&R plan. Like previous tables, most of these tables allow you to add items and delete non-default items. To edit a cell in the table, click on the cell you wish to edit and enter the new value. Once changes are made, they are automatically saved to the system. A brief description of each table follows.

Localized Stopgap M&R Tables And Families

- Work Types: A listing of all work types classified as localized repairs. Work types can be added or deleted by clicking on the associated buttons on this tab.
- Cost by Work Type Tables: You can create different cost tables to correspond with different jobs or regions. Previously created tables can be seen by clicking on the drop-down list box. Tables can be created, deleted, or renamed by clicking on the associated buttons. If a new table is created, a window will first appear prompting the user to enter a name for the new table. This window also provides the user the ability to copy the default table to use as a template. The costs associated with the work types can be customized on any of the tables, including the default table. If a desired work type is not included on a table, the work item must first be entered on the Work Types tab. Once the new item has been entered on the Work Type tab, the Add or Delete button can be used to modify any table. There must be a cost entered for all work types listed.
- Distress Maintenance Policies: You can define separate tables and group different localized work types for different maintenance scenarios.
- Consequence of Maintenance Policy: For every work type listed on the Work Types tab, there is an associated table here. Each table consists of a list of all distresses related to a particular work type, and the distress produced as a result of performing the specified work. This assists the Work Plan in predicting future PCIs.
- Stopgap Cost by Condition: On this tab, M&R costs are related to the condition of the pavement. As seen in the default table, costs to repair a pavement increase as the pavement condition (PCI) decreases.

- Stopgap M&R Families: On this tab, Stopgap M&R Families can be defined for use with the M&R plan. Once a new M&R family has been created, the previously defined Distress Maintenance Policy, Cost by Work Type, Cost by Condition, and Sort Order can be assigned to it. To add sections to a M&R family, refer to M&R Family Assignment.

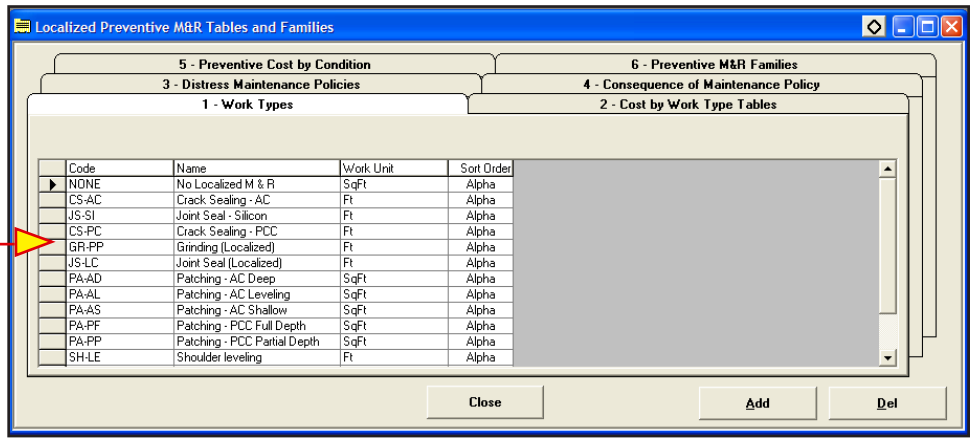


Localized Preventative M&R Tables And Families

- Work Types: A listing of all work types classified as localized repairs. Work types can be added or deleted by clicking on the associated buttons on this tab.
- Cost by Work Type Tables: You can create different cost tables to correspond with different jobs or regions. Previously created tables can be seen by clicking on the drop-down list box. Tables can be created, deleted, or renamed by clicking on the associated buttons. If a new table is created, a window will first appear prompting the user to enter a name for the new table. This window also provides the user the ability to copy the default table to use as a template. The costs associated with the work types can be customized on any of the tables, even the default table. If a desired work type is not included on a table, the work item must first be entered on the Work Types tab. Once the new item has been entered on the Work Type tab, the Add or Delete button can be used to modify any table. There must be a cost entered for all work types listed.
- Distress Maintenance Policies: You can define separate tables and group different localized work types for different maintenance scenarios.
- Consequence of Maintenance Policy: For every work type listed on the Work Types tab, there is an associated table here. Each table consists of a list of all distresses related to a particular work type, and the distress produced as a result of performing the specified work. This assists the Work Plan in predicting future PCIs.
- Preventive Cost by Condition: On this tab, M&R costs are related to the condition of the pavement. As seen in the default table, costs to repair a pavement increase as the pavement condition (PCI) decreases.

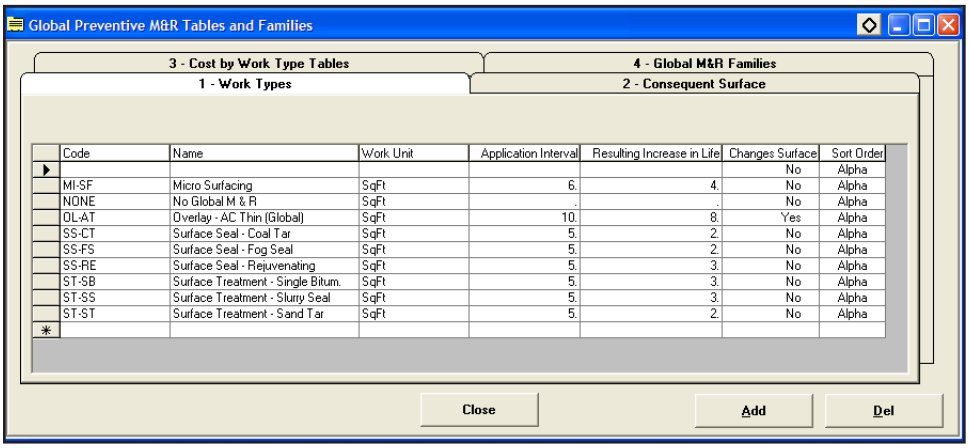
- Preventive M&R Families: On this tab, Preventive M&R Families can be defined for use with the M&R plan. Once a new M&R family has been created, the previously defined Distress Maintenance Policy, Cost by Work Type, Cost by Condition, and Sort Order can be assigned to it. To add sections to a M&R family, refer to M&R Family Assignment.

All Localized Work Types are listed here


Localized Preventive M&R Tables and Families
5 - Preventive Cost by Condition
6 - Preventive M&R Families
3 - Distress Maintenance Policies
4 - Consequence of Maintenance Policy
1 - Work Types
2 - Cost by Work Type Tables
Code Name Work Unit Sort Order
NONE No Localized M & R SqFt Alpha
CS-AC Crack Sealing - AC Ft Alpha
JS-SI Joint Seal - Silicon Ft Alpha
CS-PC Crack Sealing - PCC Ft Alpha
GR-PP Grinding (Localized) Ft Alpha
JS-LC Joint Seal (Localized) Ft Alpha
PA-AD Patching - AC Deep SqFt Alpha
PA-AL Patching - AC Leveling SqFt Alpha
PA-AS Patching - AC Shallow SqFt Alpha
PA-PF Patching - PCC Full Depth SqFt Alpha
PA-PP Patching - PCC Partial Depth SqFt Alpha
SH-LE Shoulder leveling Ft Alpha
Close
Add
Del

Global Preventative M&R Tables And Families

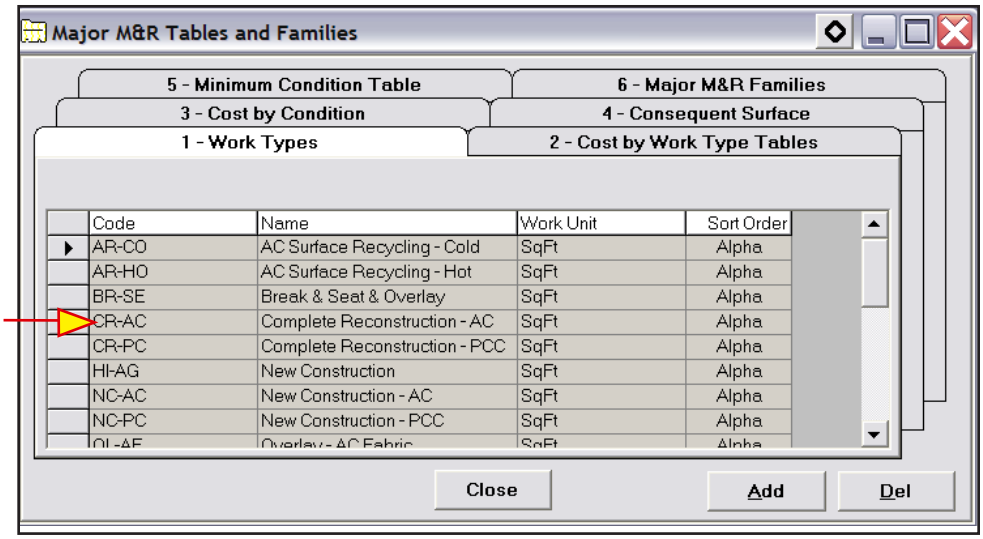
- Work Types: This is a listing of all work types considered Global. This includes M&R work applied over a larger area of pavement. Other data in this table includes the Application Interval that work would be reapplied, and the Delta Age, or change in age, of the pavement. This "Delta" is defined as the time (in years) it would take for the condition of the pavement to return to where it was prior to application of the global treatment. Again, the M&R Plan uses these numbers when predicting condition.
- Consequent Surface: This table provides data as to the consequent (resultant) surface produced when a given work type is performed over different surface types. Yellow fields indicate changes in surface type.
- Cost by Work Type Tables: This is similar to Localized. The user can create different cost tables depending on the scenario.


Global Preventive M&R Tables and Families
3 - Cost by Work Type Tables
4 - Global M&R Families
1 - Work Types
2 - Consequent Surface
Code Name Work Unit Application Interval Resulting Increase in Life Changes Surface Sort Order
No Alpha
MI-SF Micro Surfacing SqFt 6. 4. No Alpha
NONE No Global M & R SqFt . . No Alpha
OL-AT Overlay - AC Thin (Global) SqFt 10. 8. Yes Alpha
SS-CT Surface Seal - Coal Tar SqFt 5. 2. No Alpha
SS-FS Surface Seal - Fog Seal SqFt 5. 2. No Alpha
SS-RE Surface Seal - Rejuvenating SqFt 5. 3. No Alpha
ST-SB Surface Treatment - Single Bitum. SqFt 5. 3. No Alpha
ST-SS Surface Treatment - Slurry Seal SqFt 5. 3. No Alpha
ST-ST Surface Treatment - Sand Tar SqFt 5. 2. No Alpha
Close
Add
Del

Major M&R Tables And Families

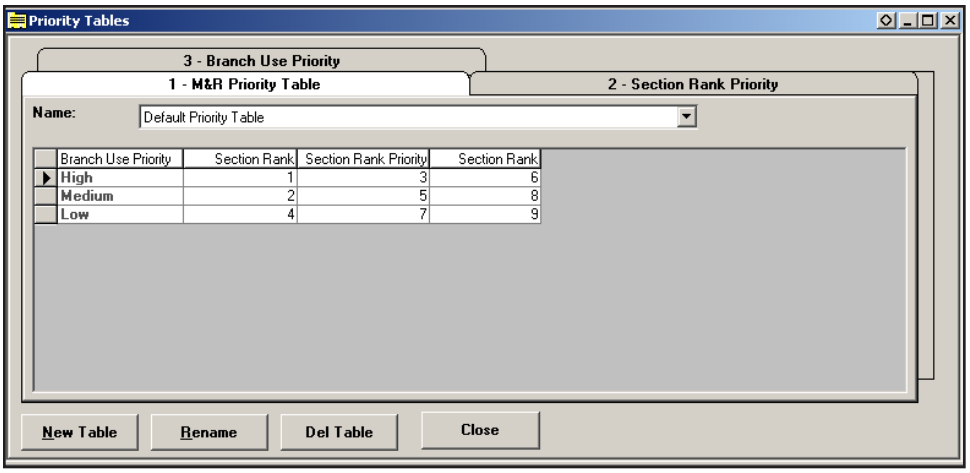
- Work Types: All work types considered to be major are listed here.
- Cost by Work Type Tables: All costs associated with Major M&R work types are listed here.
- Cost by Condition: All costs associated with specific condition types are listed here.
- Consequent Surface: This is similar to Global, and lists surface types which result from the performance of work types on different surfaces.
- Minimum Condition: This table allows the user to set the critical PCI (Minimum Condition) for each year.

Select priority for Major M&R for each Branch Use



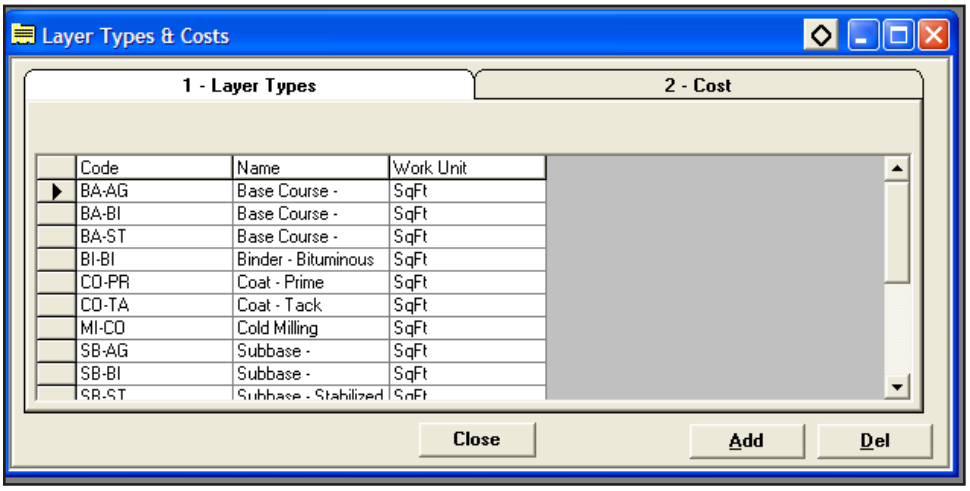
Priority Tables

- M&R Priority Table: This table allows the user to prioritize pavements based on branch use and section rank. The default table is ranked from 1, highest priority, to 9, lowest priority. New tables must have a ranking for each category, and two or more categories are able to have the same ranking.
- Section Rank Priority: The user may assign a priority to pavements based on section rank.
- Branch Use Priority: The user has the ability to assign a priority to pavements based on their declared usage. Branch use priority is considered during M&R Plan execution and determines how limited funds are allocated.



Layer Types And Costs

- Layer Types: Codes and work units for all layer types are listed here.
- Costs: Costs associated with layer types are listed here.



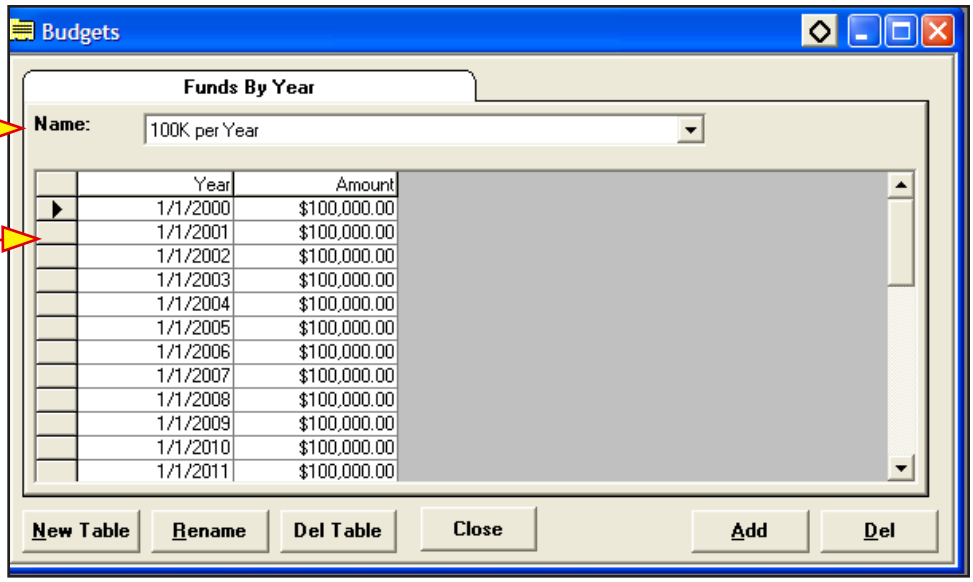
Budgets

Here, you can create tables to specify a budget for each year. When running the Work Plan, you can select from a list of budgets. To create your own budget, click on New Table. You are given the option of copying the budget that is displayed. When creating a new table, select the copy option to save time entering data if most values are the same. Enter Year and budget Amount information. By placing actual budget numbers in a budget table, you can restrict the spending of the work plan to a specific budget. Creating different budget tables also allows you to compare the results of different Work Plan scenarios.

Hint
You can create a budget of $10,000/ Year by using the Budget multiplier feature, in the M&R Work Plan.

All budgets in your system are listed here

Enter a budget amount for each year



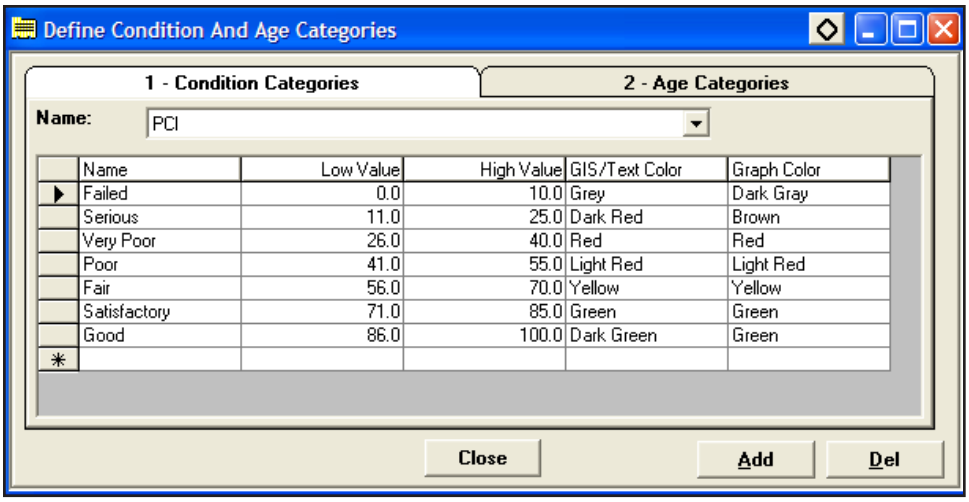
Condition Tools

Select Condition Types

To make condition types available for use in PAVER™, they must be declared in this window. Condition types will be classified as Numeric or Textual, and you may declare Minimum and Maximum Values for Numeric Condition Types. To make a condition available for use in PAVER™, choose “yes” in the Selected column. If you would like to keep the condition data in the table for future use but do not wish to make it accessible, a “no” in the Selected field hides the condition from the program.

Define Condition And Age Categories

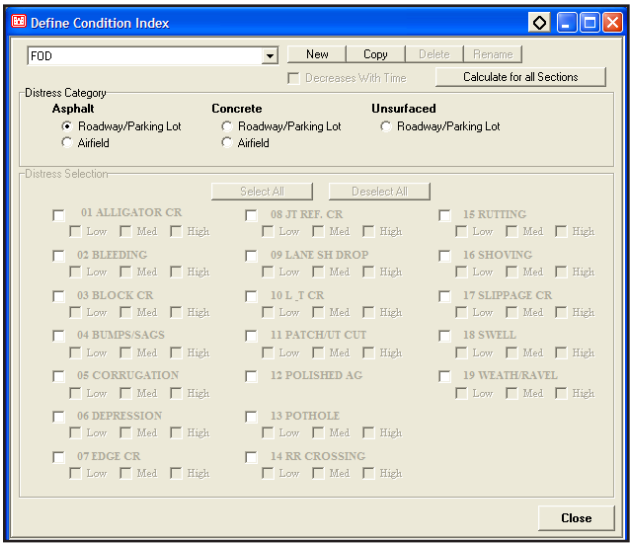
The user may establish a set of categories for each condition available in PAVER™. The table for each set of condition categories consists of a name for the category (i.e. “Good”, “Poor”, etc), a high and low value to establish the range for the category, and associated colors for each category to be used in the graph and GIS text. The Age Categories tab is simply a table of age brackets by which you can group pavements. These tables are used in the graphical display of condition information throughout PAVER™.



Define User Distress Indices

You have the option to create a user-defined index. These indices are computed with the same engine that PAVER™ uses to calculate the PCI, so the index is a customized PCI. After naming the index, select every distress and severity level that is to be included in the computation. At this point, PAVER™ then uses deduct values from only the specific distresses indicated, ignoring other distresses. After naming the index and selecting the applicable distresses, this distress appears on the Numeric Condition Types tab of the Condition Type Selection table. To delete the newly created index, return to the User-defined Distress Indices table.

New
You may now create your own condition index based on your selection of distresses.



Miscellaneous Other Tables

There are four tables that allow you to enter specific information into PAVER™:

Aircraft Type

This table holds information on a variety of aircraft and will be used in later versions of PAVER™ to catalog airfield traffic and its effect on pavement condition.

Materials

This table is a list of all material types, including Item number and Description, that are available for selection within PAVER™. These are used in the Work section of PAVER™, where you can list the specifics of work that has been performed, including the type of material used. You can add any material types to this list by entering an Item and Description.

Layer Construct

This table contains information on different work types associated with base preparation. To enter a line item of work specifically for base course, establish the work type in the Layer Construct table. The information on these lists is accessible from Work, under the History tab.

Unit Of Measure (Field) Settings

Here, select a particular unit from a picklist to be associated with measurements used within PAVER™.

4 Database Tools

Combine/Subset Database 40

Import/ Export 41

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Create PAVER™ Inventory From Shape Data 43

Combine/Subset Database

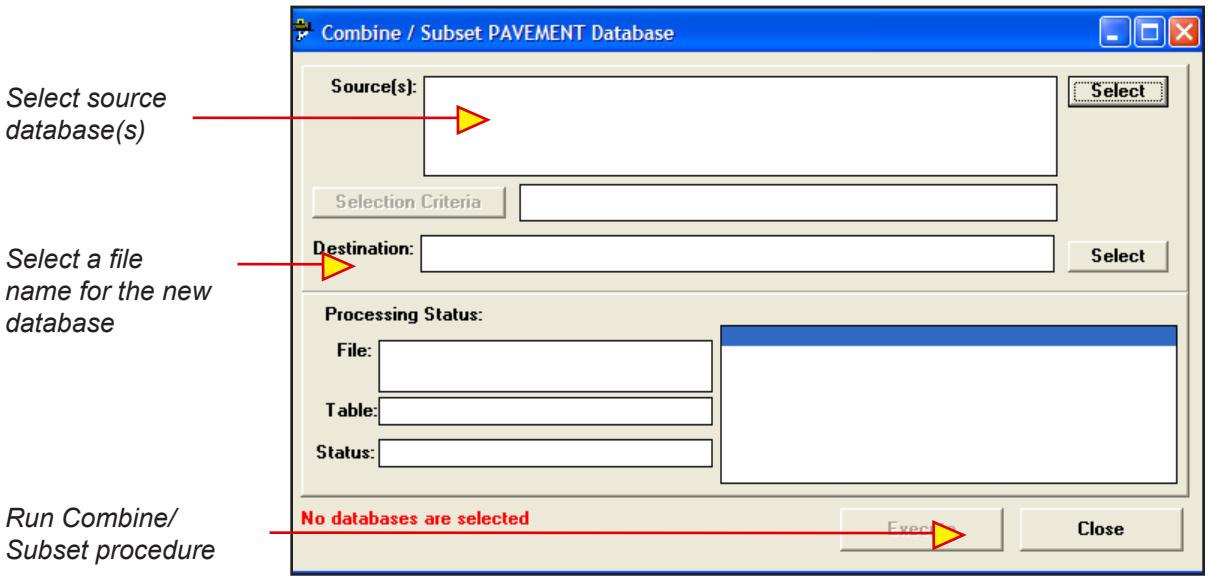
The Combine/Subset option enables the user to combine multiple databases or database segments, into a single database, or to separate databases into multiple segments. This tool is located in external 6 Database Tools, which may only be run when PAVER™ 6 is closed. The Combine option is also useful for making a copy of a database in an effort to protect an original.

The Combine/Subset form has four components: source file selection, selection criteria, destination file specification, and processing status. Click the Select button associated with the large file selection list window, labeled Source, to identify the file(s) to be combined, split, or copied. To combine databases, select two or more files. Select one file if you are subsetting or copying a file. Specify the target for the combined or subset database by clicking the Select button associated with the window labeled Destination. Enter a new file name for the database to be created.

The Selection Criteria button invokes the EMS™ Query Tool to filter the source databases. For example, you can combine several databases choosing to select only those sections from the source databases that have surface type equal to AC and rank equal to P (primary). Note that the selection criteria you specify depends on the values in the first source database you select for the combine operation. For example, if the first database you select has no AC pavements, the EMS™ Query Tool cannot be set to select AC as the filter for surface type.

Note
It is recommended that you utilize a scratch file (a temporary working file) as the destination for all Combine/Subset operations.

The Execute button launches the Combine/Subset operation. The processing status area of the screen monitors the progress of your operation and posts the results. Once complete, click Close to close the Combine/Subset form and return to the PAVER™ desktop. Use the File >> Open option from the PAVER™ Menu to select the newly combined, subset, or copied database.



Import/ Export

The Import/ Export utilities, located in the external 6 Database Tools, are used to exchange data between different computers running PAVER™. The database sender uses PAVER™ Export to create a single file. The receiver uses PAVER™ Import to transform a single file (with the extension *.e40, *.e50, *.e60, or *.e65) to a working pavement database in his/her PAVER™ system. Once in the system of the receiver, the database can be opened.

Note
*It is recommended to always export data as an *.e65 file, unless the exported file is for use in PAVER™ 6.1.6 or earlier.*

6.5 Export Procedure

The 6.5 Export window is divided into four sections: Export Type, Options, File Selection, and Working Status. The contents of the Export file are determined by the selection of one of two export options located at the top of the Export form:

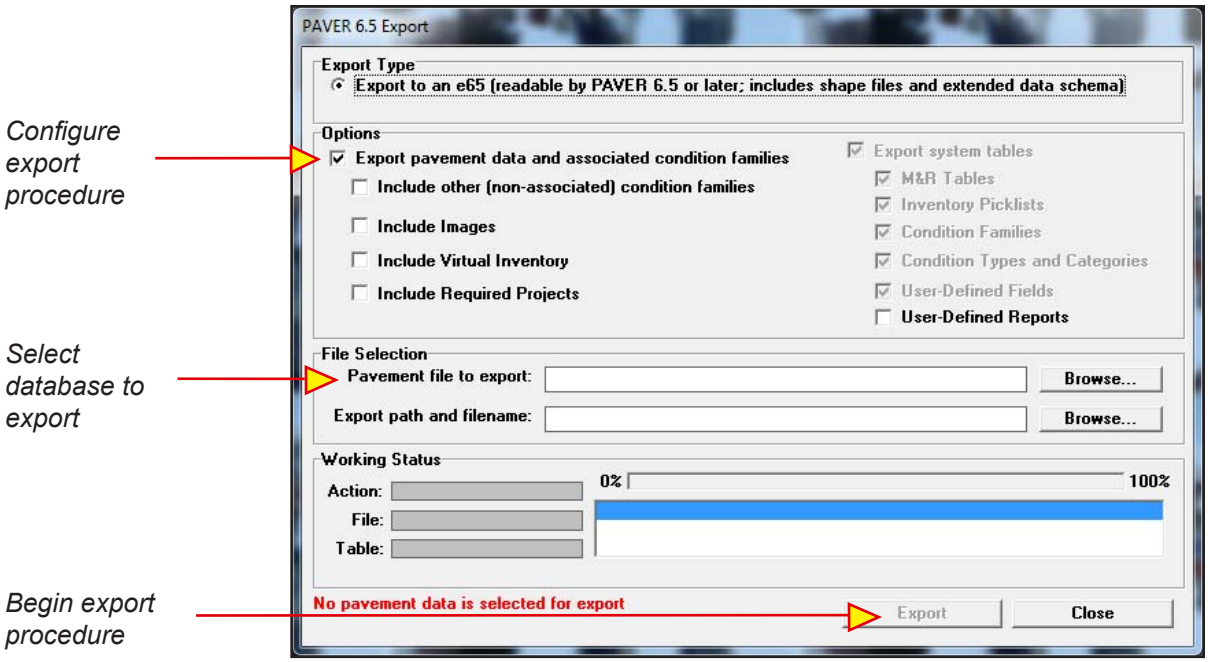
*When Exporting To An *.e65 File:*

- The user has the option to include User-defined Reports.
- When exporting System Tables only, the option is available to export specific components of the System Tables.
- GIS shapefile is automatically included with data.

Configure the 6.5 Export file by selecting the checkbox(es) next to the appropriate option(s). As you configure your export file, consider that the system importing the file you are creating, imports all the information in the export file, unless the importing user takes special steps not to overwrite existing files. If you specify that an export file includes all system files, the person importing your file will replace their system files with the system files that you have exported.

When creating an export file, you must specify the pavement database to export. You may do this by clicking the Browse button in the File Selection area for Pavement file to export. The export file that is created will be located as indicated by the Export path and file name selection.

When these steps are complete, click the Export button located on the lower left portion of the export window. The Working Status portion of the export window displays the progress of the export process and indicates the completion of the export file. You may reconfigure the export options to create another export file or click the Close button to leave 6.5 Export.



6.5 Import Procedure

The 6 Import screen is divided into four sections: File Selection, How to Import System Tables, Tables to Import, and Working Status. In File Selection, click the Browse button for Import file name to specify the file to be imported. These include files with the formats *.e60, *.e50, as well as *.e40. Select the type of file that you would like to import and then select the file. A second Browse button is associated with the Import path. The Import path refers to the location and name you wish to assign to the pavement data that is to be imported. When you identify a file for a database under the Import file name selection, the default name for the database is placed in the Import path box. Clicking the Browse button associated with the Import path opens the Open/ Create Pavement Subdirectory form. You can edit this form to change the default selection. The form shows the default path to your pavement databases and provides a picklist of your existing pavement databases. You can select an existing database (in which case the data you are importing overwrites the existing database) or type in a new name, and the import file will be copied to this new name.

Note
*When importing an *.e65 file, if the box is checked for "Pavement data and associated families" under Tables to Import, the System Tables boxes gray out in order to maintain consistency in imported data.*

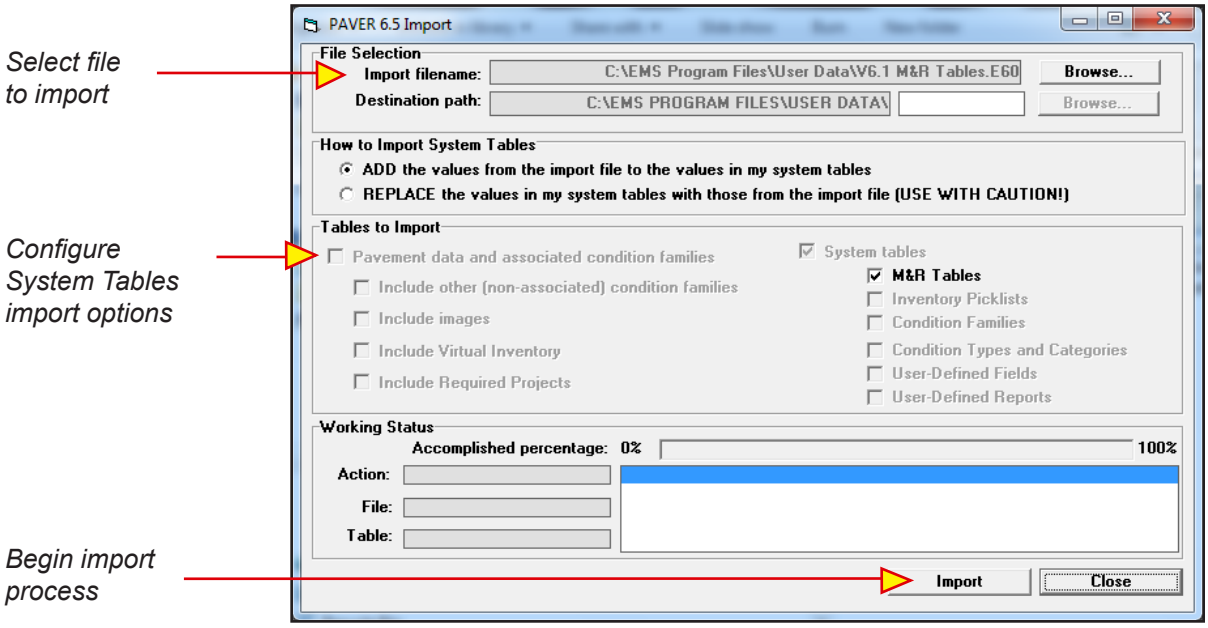
The How to Import System Tables portion provides two options. The first option allows the user to add only values from imported files that do not exist in their current System Tables. The other option completely replaces the existing System Tables with those being imported. When using the second option, it is STRONGLY recommended that the user produce a backup of the existing System Tables.

The Tables to Import provides several options as well. When importing an *.e60 file, the user has the option of selecting specific components of the System Tables to import. When importing an *.e50 file, the user has the option to import System Tables in their entirety or not at all.

Note
*When importing *.e65 files, if the "Pavement Data and associated condition families" box is left unchecked under Tables to Import, the user may choose the data to import from the System Tables.*

Clicking on the Import button launches the import routine. If the import routine does not cause any existing data to be overwritten, the import procedure will proceed uninterrupted. If the import routine is configured such that it will overwrite existing data (either pavement data or system data) a Windows message box appears and presents you with three options: Abort to skip this file, Retry to overwrite the current file, and Ignore to overwrite all files. Select the appropriate choice.

When the import procedure is completed, the PAVER™ status window shows a Done message. Click the Close button to leave the 6 Import Window. The data you imported can be opened by choosing File>> Open from the PAVER™ Menu. Select the imported database from the list of available PAVER™ databases.



Create PAVER™ Inventory From Shape Data

The Create PAVER™ Inventory From Shape Data tool allows the user to generate a complete PAVER™ database from an existing ESRI shapefile.

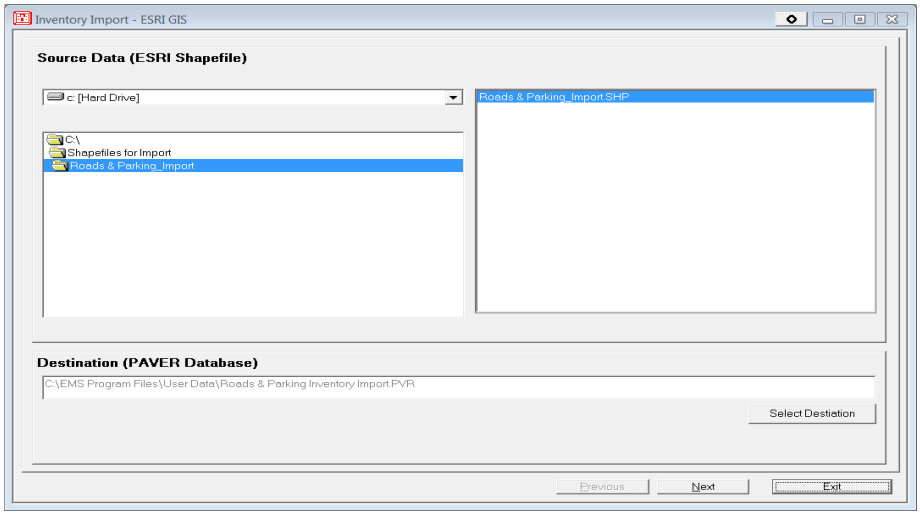
Before the user is able to import an ESRI shapefile, there are 15 mandatory PAVER™ fields that must be populated in the shapefile's attribute table. These fields need to be populated for each of the GIS polygons which correspond to a pavement section. Each of the 15 fields has specific criteria for its field type and length that must be followed. These are shown below:

Field	Type	Size	Note
NetworkId	String	10	
Network Name	String	60	
BranchId	String	10	
Branch Name	String	35	
Branch Use	String	10	
SectionId	String	10	
From	String	35	
To	String	35	

Field	Type	Size	Note
Surface	String	3	
Rank	String	1	
Construction Date	Date	mm/dd/yyyy	
Length	Numeric	Double	*
Width	Numeric	Double	*
Slab Length	Numeric	Double	*
Slab Width	Numeric	Double	*
True Area	Numeric	Double	*
* Entered as feet (except True Area entered as SF)			

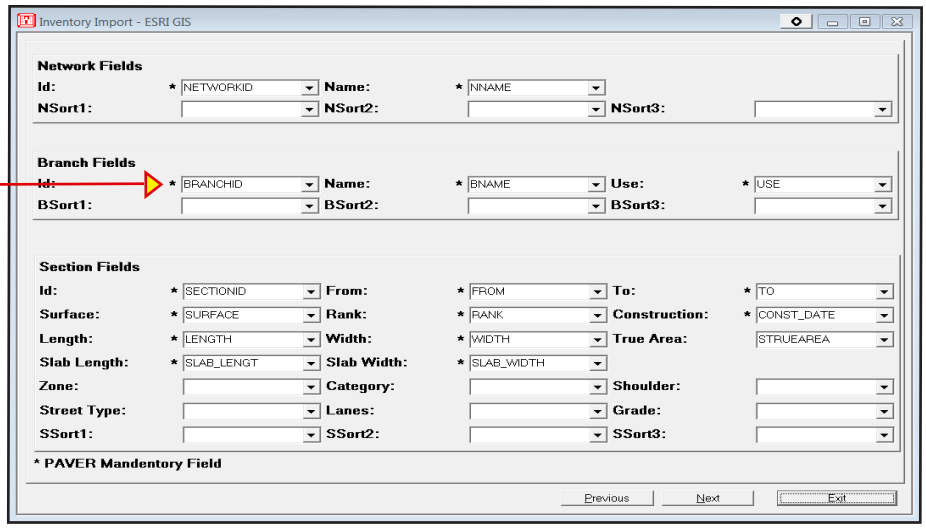
Additional user-defined fields can be present in the shapefile and brought into PAVER™. One example would be the field "Category", with string as its field type and 1 as its field size. Another example is "Shoulder", with string as its field type and 3 as its field size.

The Create PAVER™ Inventory From Shape Data tool contains five display screens. The first display screen shows the source shapefile data and the destination path for the PAVER™ database. The source data is where the user navigates to the shapefile that will be imported to create the PAVER™ database. The destination path is where the database will be created. The user has the ability to either create a new database or overwrite an existing PAVER™ database. If the user chooses to overwrite an existing database, all of the data will be replaced by the created database.



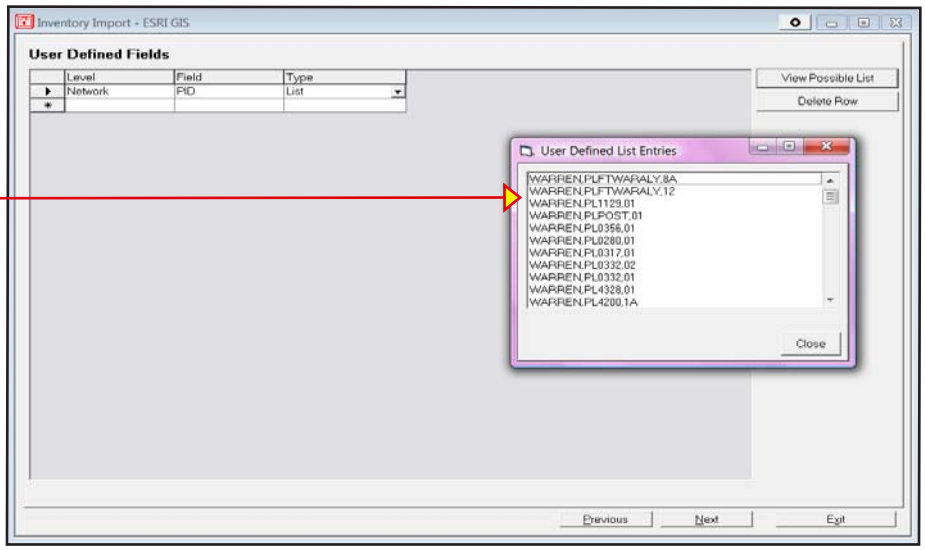
The second display screen is where the PAVER™ database fields are matched with the fields in the shapefile's attribute table. PAVER™ is able to recognize some field names, but unrecognized fields can be selected using the drop-down list next to the field. These includes the 15 mandatory fields that must be present in the attribute table in order for the PAVER™ database to be created.

Asterisk indicates a PAVER™ Manatory Field


Inventory Import - ESRI GIS
Network Fields
Id: * NETWORKID Name: * NNAME
NSort1: NSort2: NSort3:
Branch Fields
Id: * BRANCHID Name: * BNAME Use: * USE
BSort1: BSort2: BSort3:
Section Fields
Id: * SECTIONID From: * FROM To: * TO
Surface: * SURFACE Rank: * RANK Construction: * CONST_DATE
Length: * LENGTH Width: * WIDTH True Area: STRUEAREA
Slab Length: * SLAB_LENGT Slab Width: * SLAB_WIDTH
Zone: Category: Shoulder:
Street Type: Lanes: Grade:
SSort1: SSort2: SSort3:
* PAVER Mandentory Field
Previous
Next
Exit

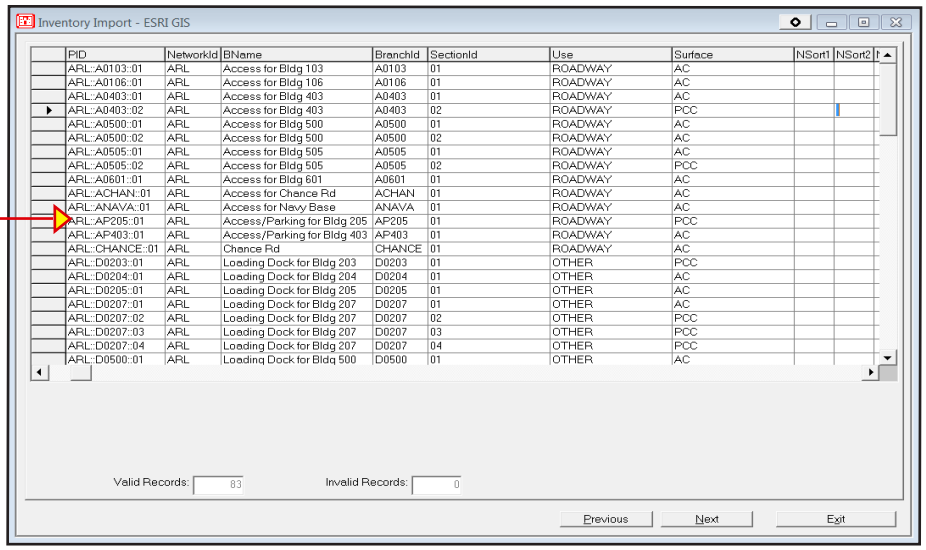
The third display screen allows the user to select any additional user-defined fields that are not included on the second display screen of standard PAVER™ fields. These fields must be created in the attribute table and then the user will have to select the level at which the field is assigned (i.e. Network/ Branch/ Section). If the field type is a list, the "View Possible List" button will become available to select. Multiple user-defined fields can be selected or removed before importing the shapefile to a database.

View the details of the selected user-defined field



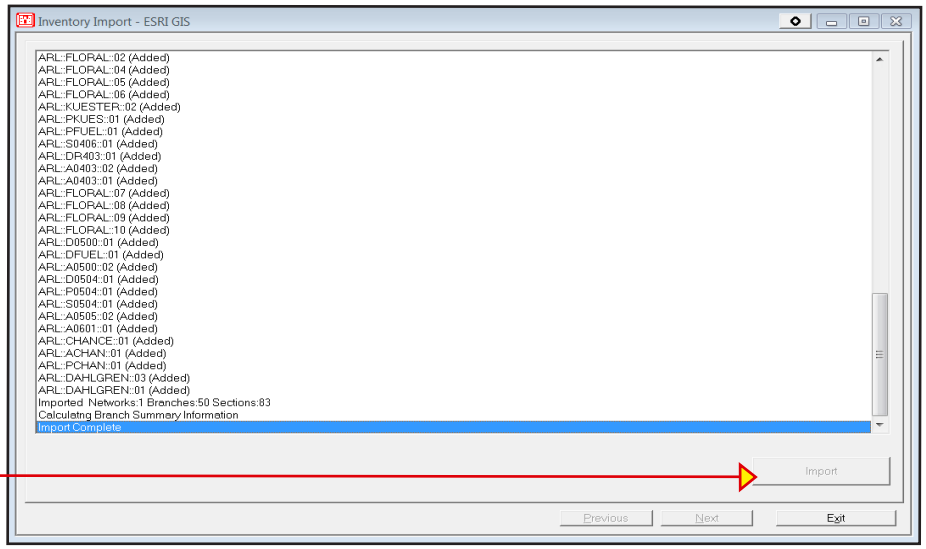
The fourth display screen shows the attribute table with all of the valid and invalid records. Any row that is highlighted in yellow is an invalid record which will gray out the Next button on the form. All invalid records need to be corrected in the shapefile before it can be imported as a PAVER™ database.

Yellow areas indicate invalid records


Inventory Import - ESRI GIS
PID NetworkId BName BranchId SectionId Use Surface NSort1 NSort2
ARL:A0103:01 ARL Access for Bldg 103 A0103 01 ROADWAY AC
ARL:A0106:01 ARL Access for Bldg 106 A0106 01 ROADWAY AC
ARL:A0403:01 ARL Access for Bldg 403 A0403 01 ROADWAY AC
ARL:A0403:02 ARL Access for Bldg 403 A0403 02 ROADWAY PCC
ARL:A0500:01 ARL Access for Bldg 500 A0500 01 ROADWAY AC
ARL:A0500:02 ARL Access for Bldg 500 A0500 02 ROADWAY AC
ARL:A0505:01 ARL Access for Bldg 505 A0505 01 ROADWAY AC
ARL:A0505:02 ARL Access for Bldg 505 A0505 02 ROADWAY PCC
ARL:A0601:01 ARL Access for Bldg 601 A0601 01 ROADWAY AC
ARL:ACHAN:01 ARL Access for Chance Rd ACHAN 01 ROADWAY AC
ARL:ANAVA:01 ARL Access for Navy Base ANAVA 01 ROADWAY AC
ARL:AP205:01 ARL Access/Parking for Bldg 205 AP205 01 ROADWAY PCC
ARL:AP403:01 ARL Access/Parking for Bldg 403 AP403 01 ROADWAY AC
ARL:CHANCE:01 ARL Chance Rd CHANCE 01 ROADWAY AC
ARL:D0203:01 ARL Loading Dock for Bldg 203 D0203 01 OTHER PCC
ARL:D0204:01 ARL Loading Dock for Bldg 204 D0204 01 OTHER AC
ARL:D0205:01 ARL Loading Dock for Bldg 205 D0205 01 OTHER AC
ARL:D0207:01 ARL Loading Dock for Bldg 207 D0207 01 OTHER AC
ARL:D0207:02 ARL Loading Dock for Bldg 207 D0207 02 OTHER PCC
ARL:D0207:03 ARL Loading Dock for Bldg 207 D0207 03 OTHER PCC
ARL:D0207:04 ARL Loading Dock for Bldg 207 D0207 04 OTHER PCC
ARL:D0500:01 ARL Loading Dock for Bldg 500 D0500 01 OTHER AC
Valid Records: 83
Invalid Records: 0
Previous
Next
Exit

The fifth display screen is where the user can choose to import the shapefile into a usable database. The message box shown displays all of the information regarding each section being created as an inventory item in the database. Once the information has been imported, the polygons are automatically linked to the pavement sections in the PAVER™ database.

Click Import to create a new database



5 Inventory

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Inventory Definition

Basic Operations

> *Note*
> *To view data for a specific network, it must be chosen in one of the Inventory Item Selectors.*

The Inventory button provides tools to view, edit, and define pavement networks. Clicking on the Inventory button opens two windows: List Selector and inventory data.

The List Selector is a series of drop-down boxes that allow you to navigate to a specific point in the inventory. Select the particular inventory item by working down the hierarchy of the database, from network to branch to section, at each level selecting an item by its ID or Name.

In the inventory data window the user can edit inventory data. Access data for a particular level by clicking the tab for Network, Branch, or Section. To change the displayed inventory item, locate the item in the Inventory Item List Selector and the inventory data window will update itself accordingly.

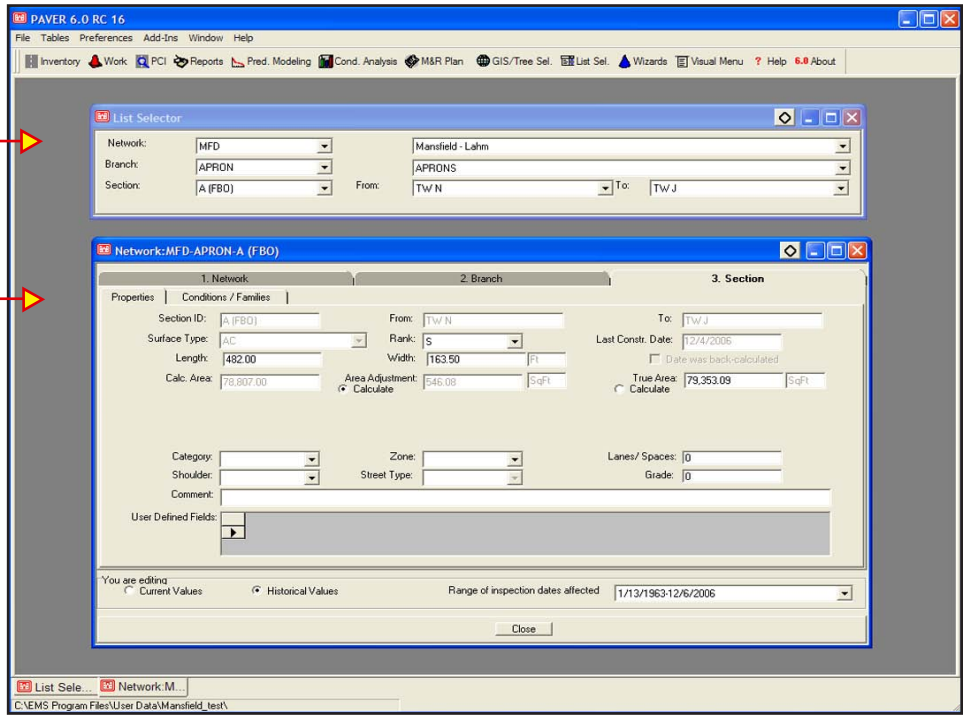
At the bottom of the inventory data window, the user is able to select the type of inventory data values to edit. The user can edit Current Values, which are the current data values used for new inspections and calculations, or Historical Values, which are relative to past inspection data. Modified Historical Values do not have any effect on current PCI values and calculations. For Historical Values, PAVER™ will provide a range of inspection dates affected with consistent inventory data values.

You may move to different fields on the inventory data form by clicking on the field you wish to edit in order to enter information. You may also move from field to field on the form by pressing the tab key. Each press of the tab key shifts the selected field once to the right, and at the end of a row the tab key shifts the selected field down one row to the furthest left field.

Data fields in PAVER™ 6 only accept entries of a determined type of characters. For example, a distance field can contain only numeric information, and if you try to enter non-numeric characters into a distance field, the program will not accept your entry.

Inventory Item Selector

Inventory data corresponds with List Selector window



Each of the inventory cards (Network, Branch, and Section) have six buttons along the bottom of the form. The New button is for adding new inventory items. The Copy button is used to create a new network, branch, or section identical to the selected network, branch, or section, except that the Network, Branch, or Section ID will include the characters “CC” to indicate that it is a copy. None of the copied network’s children (branches and sections) are copied when a network is copied. Likewise, when a branch is copied, none of its sections are copied.

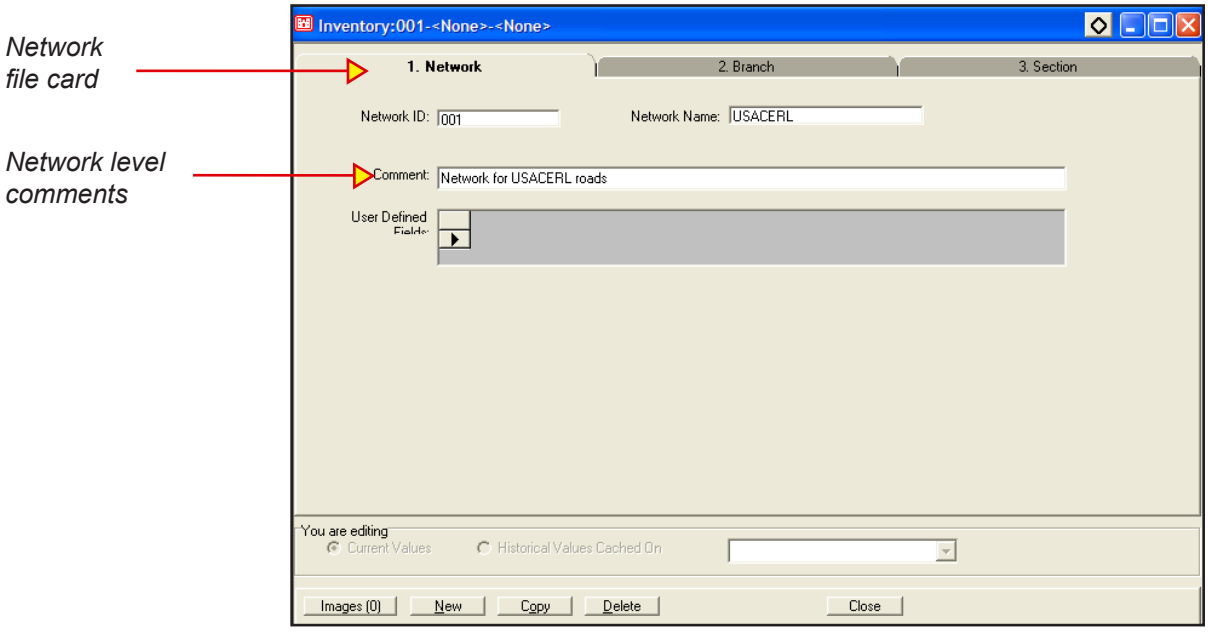
Clicking Delete deletes the selected network, Images launches the EMS™ Image Viewer, and Close closes the Inventory program.

You may also assign values for user-defined fields once parameters for the user-defined fields have been established (See System Tables >> Define User Fields). When completed, the inventory can be sorted based on user-defined criteria for many applications in PAVER™.

Creating Networks

The first step in building a pavement inventory for a military installation, city, or airport, is to create a network. A hierarchical structure exists for pavement inventory items in PAVER™ 6. Networks are the parents of branches, and branches are the parents of sections. To create pavement branches and sections, first create a network.

To create a network, click Inventory on the PAVER™ Button Bar. The inventory data form appears with the Network file card displayed. Click the New button at the bottom of the Network file card to populate all fields identifying the current network. The fields Network ID, Name, and Comments, should be edited to the desired values. You may also enter data in any User-defined Fields that you have created.



Creating Branches

To create a branch, click the Inventory button on the PAVER™ Button Bar. The inventory data window appears with the Network file card displayed. Click the file card tab 2. Branch to access the Branch file card. If you have just added a new network, the network will have no branches defined. Click the New button at the bottom of the file card to enter a new branch. The fields on the branch

data entry form become populated with the label “new” or are blank, depending on the type of field (i.e. text, numeric, or picklist). Enter the appropriate values. Some fields are locked, and will automatically reflect section data once sections for the branch are created.

The contents of the Use field are limited to a single value that is selected from a preexisting list of choices. To enter a value in the Use field, select the field, and a down arrow will appear on the right side of the field data entry area. Click on the arrow for a list of available choices in a scrolling picklist.

If there are more items in the list than can be shown in a single short list (usually 5 to 10 items), the list is displayed with a scroll bar arranged along the right side of the list. Use the scroll bar arrows to select an item not visible in the list. When the picklist is very long, you may want to locate items in the list by typing the first character of your selection. The program seeks out matches for the characters you type.

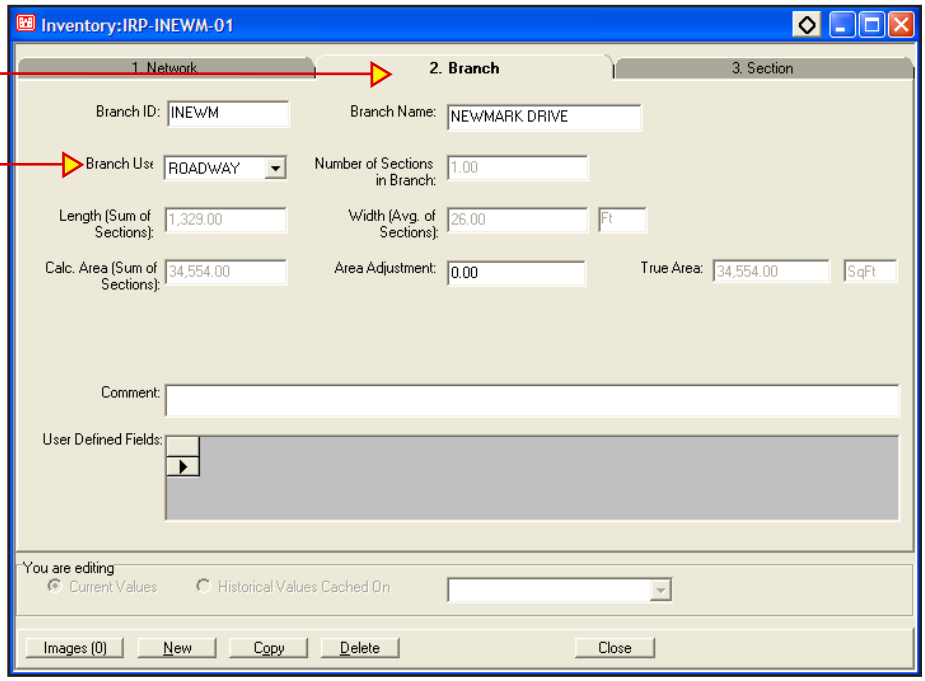
Note
You may add items to the Use picklist under Define User Fields in System Tables.

If the picklist does not contain the item you wish to enter, you need to add the item to the picklist. To enter a new item to the Use picklist, select Tables from the PAVER™ Menu located along the top of the PAVER™ screen, then Inventory Picklist, and then the Branch Use tab. For further information, see Chapter 3 System Tables >> Edit Inventory Picklists.

The Branch file card contains three area fields: Calculated Area (Sum of Sections), Area Adjustment, and True Area. The Calculated Area field is the sum of the true section areas of the branch. The Area Adjustment field is used to reflect special knowledge the user may have about branch area, which is not incorporated in the Calculated Area. Decreases in branch area should be entered as negative values. The Section card also has an area adjustment field, so the user does not need to reflect section level area adjustments in the branch Area Adjustment field. True Area is Calculated Area plus Area Adjustment. True Area is the value used in PAVER™ calculations and reports.

Branch file card

The user can create branch uses



Creating Sections

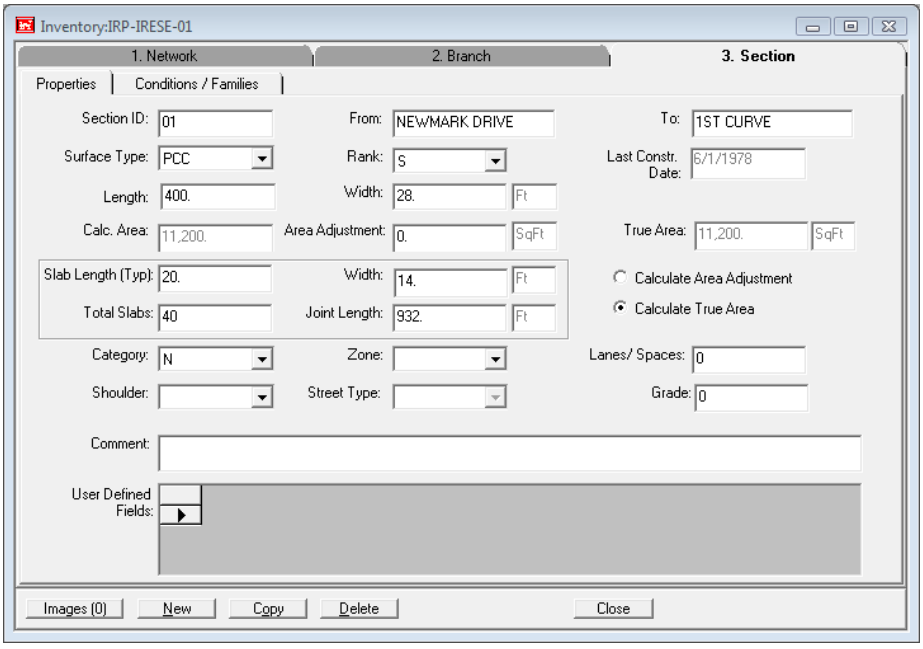
To create a section click on Inventory on the PAVER™ Button Bar. The inventory data form appears with the Network file card as the active form. Click the file card tab 3. Section to bring focus to the Section data card. If you have just added a new branch, that branch will not have defined sections.

Click New at the bottom of the screen to create a new section, and enter section information in the fields starting with Section ID. Note that the Unit field cannot be directly edited by the user (see Miscellaneous Other Tables >> Unit of Measure (Field) Settings >> System Tables for details).

The Section file card contains three area fields: Calculated Area, Area Adjustment, and True Area. The Calculated Area is the product of the section's user-entered length and width and cannot be edited. The Area Adjustment field is used to reflect special knowledge the user has about section area. The user must still enter length and width information, as failure to do so will create problems in other functions of PAVER™. Decreases in section area resulting from items like cutouts should be entered as negative values. The Branch file card also has an area adjustment field, so the user does not need to reflect Branch-level area adjustments in the section Area Adjustment field. Calculated Area and Area Adjustment are added to obtain True Area, the value used in PAVER™ calculations and reports. The True Area field may be edited directly if the true area of a section is known, then PAVER™ will calculate the Area Adjustment.

> *Note*
> *Use Area Adjustment to reflect cutouts, or enter the True Area and PAVER™ will automatically calculate the Area Adjustment.*

For concrete sections there are four additional user-entered fields: Slab Length, Slab Width, Total Slabs, and Joint Length. These fields aid in determining the sections total joint length, an essential factor when determining the cost of a joint sealing project. Joint sealing is the process of cleaning and sealing or resealing PCC joints. This technique is used to mitigate surface water infiltration into the pavement foundation and to stop the accumulation of incompressibles in the joints.



The formula for calculating Total Slabs is based on the sections True Area and the average slab length and width.

$$Total\ Slabs = \frac{True\ Area}{Slab\ Length \times Slab\ Width}$$

$$Total\ Slabs = \frac{11{,}200}{20 \times 14} = 40\ Slabs$$

The formula for calculating Joint Length is based on the average slab length and width, along with the dimensions of the section. The above image shows user-entered inventory data for IRP_IRESE_01, which has a calculated Joint Length of 932 feet. The formula for Joint Length is shown below, along with the calculation for section IRP_IRESE_01.

$$Joint\ Length = \left[\left(\frac{Section\ Length}{Slab\ Length}\right) - 1\right] \times Section\ Width + \left[\left(\frac{Section\ Width}{Slab\ Width}\right) - 1\right] \times Section\ Length$$

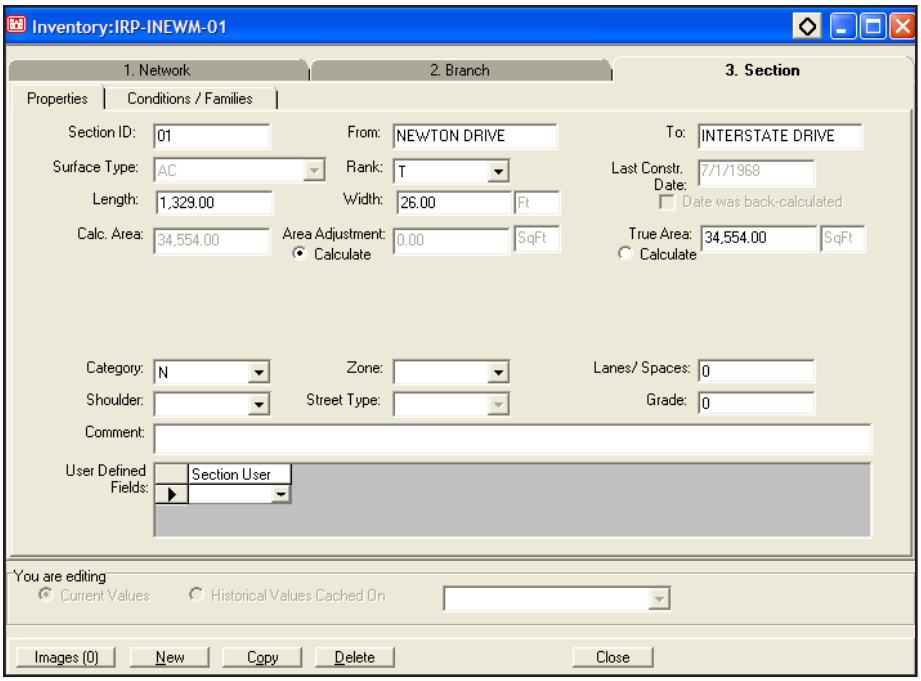
$$Joint\ Length = \left[\left(\frac{400}{20}\right) - 1\right] \times 28 + \left[\left(\frac{28}{14}\right) - 1\right] \times 400$$

$$Joint\ Length = 532 + 400 = 932\ Ft$$

If the user has specifically measured Joint Length and/ or Total Slabs, these calculated values can be overridden, allowing the user to enter their measured values.

Some of the section fields can only be changed using the choices in the picklists. Picklist choices can be edited or expanded through the Tables button above the PAVER™ Button Bar. (See Chapter 3 System Tables >> Edit Inventory Picklists for further directions.) After the basic section information, there are two boxes: Conditions and Families. Condition information cannot be edited from the Section file card, but rather can be entered in the routines run from the Field Inspect button on the PAVER™ Button Bar. The family assignment for the section (or other sections) can be changed by using the mouse to point at the Family box and double-clicking the left mouse button. Family information can also be assigned under the Prediction Model button.

Three user-defined section fields are arranged along the bottom of the screen. These fields are used to contain user-defined inventory information and can be used to sort and select inventory, maintenance, and inspection information.



Conditions/Families

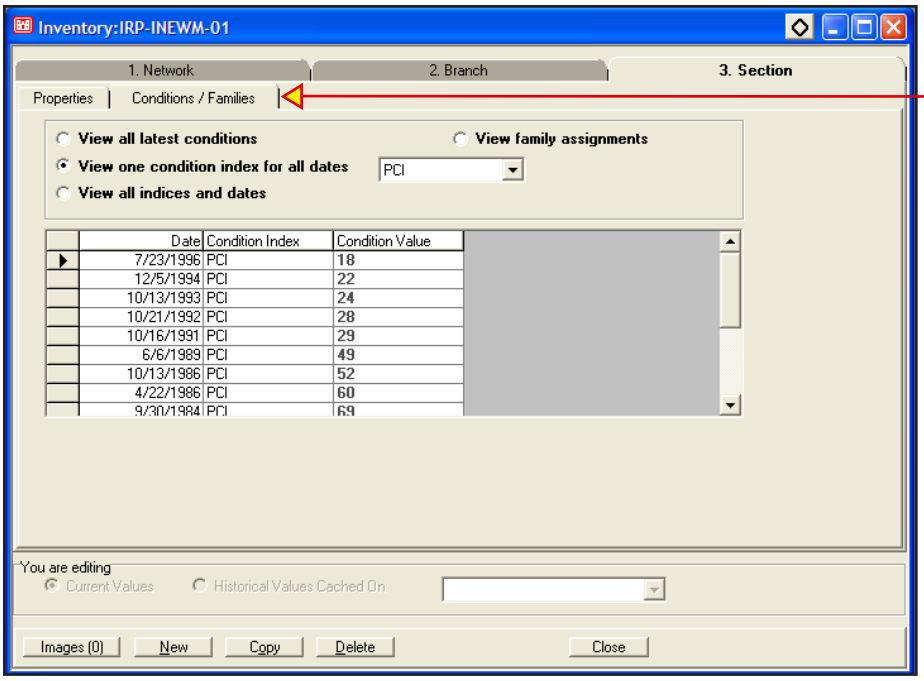
This tab provides a quick reference to condition and family assignment data for the selected section in four preset views:

- View all latest conditions: A table with the last computed (last entered) condition indices associated with the section.
- View one condition index for all dates: Shows every date for which one selected index occurred, for the current section. A drop-down list box allows the user to choose the condition for which they would like to display information.
- View all indices and dates: The complete listing of every condition index for every date occurrence listed in the section history.
- View family assignments: Shows what the current family assignment (Prediction Model) is for the selected section. Double-clicking in the Family column opens the Change Family Assignments window, providing the user the option to change the family assignment.

Note
The Conditions/ Families tab provides a quick way to see the conditions associated with all construction and inspection dates.

As with other tables in PAVER™, right-clicking on any of these tables allows the user to revise the table layout, sort the data, print, or export the data.

Condition and Age Categories, Condition Type Selection, and User-defined Distress Indices are all discussed in Chapter3 System Tables >> Condition Tools.



View the conditions and family assignments for a section

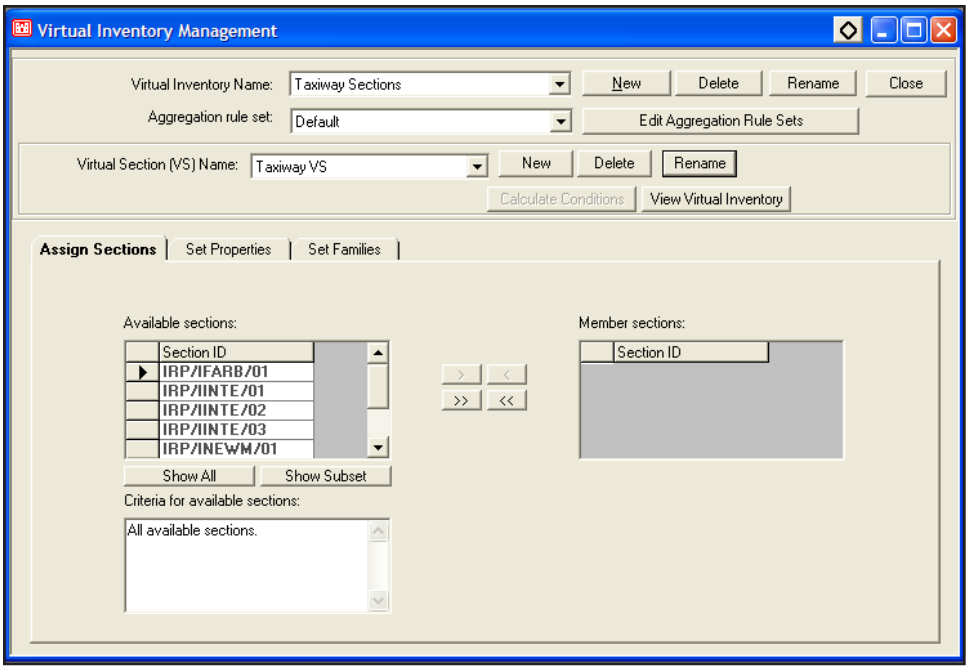
Virtual Inventory

The actual inventory consists of the original sections that were defined when the database was created, each with a PCI value. If the user wants to investigate the condition of a collection of sections, then the use of the Virtual Inventory may be of aid. The original database uses default aggregation rules, where properties (condition, construction date, grade, lanes) are calculated as averages weighted by area. If the user wants to use an alternative aggregation rule, they can utilize a Virtual Inventory.

The Virtual Inventory option in PAVER™ 6 provides the user the ability to make copies of existing inventories, in which physical sections may be combined to make a Virtual Section. For example, a virtual inventory can be created where all taxiway sections may be combined to create a virtual "taxiway" section. Conditions may then be calculated as well as reports for the virtual section.

To create a virtual inventory, go to Visual Menu >> Inventory >> Define Virtual Inventory. Click New and enter a name for the new virtual inventory. The user has the option to use different aggregation rules. To do this, click Edit Aggregation Rule Sets and create a New rule set. Select a Time interval for inspection aggregation and select the Aggregation Rule relevant to each property. Now Virtual Sections need to be created. Click New and enter a name for the virtual section. Under the Assign Sections tab, define the new virtual section. PAVER™ provides a list of Available sections from the original inventory, and the user can select multiple sections from this list and use the arrow buttons to move them under Member Sections. This collection of Member sections will be combined to define the selected virtual section. Repeat these steps to produce additional virtual sections.

After creating virtual sections, the user can review or edit the virtual section properties under the Set Properties tab. PAVER™ will display the virtual section properties (computed according to the selected Aggregation rule set) and data attributes of each of the member sections (from the original inventory), that were combined to form the virtual section. Under the Set Families tab, the user can assign the selected virtual section a Family Type and a Virtual section family.

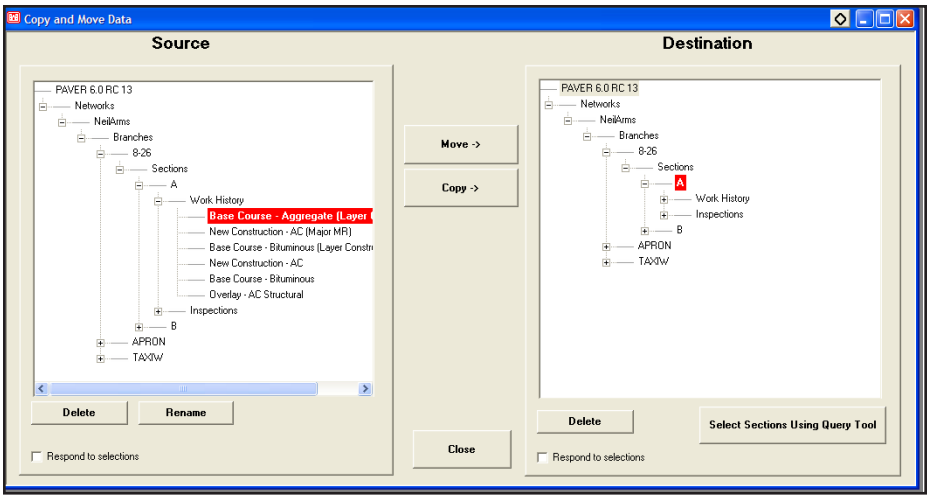


Copy And Move Data

The Copy and Move Data tool is now available under Inventory in the Visual Menu. First, select the inventory item you wish to move or copy under Source. Then select the Destination for the inventory item you wish to move or copy. Move relocates the item to the specified location, while Copy leaves the original item in its location and places a copy in the specified destination. The Move and Copy buttons remain gray until an acceptable combination of source and destination locations are chosen. For example, you cannot move a network into a section. All data movement is restricted within the open database. To move data items between databases, the user will have to combine databases using Combine/Subset Database described in Database Tools >> Combine/ Subset Database. After two databases have been combined, move or copy the data items and then split the database back into its original components.

Note
When using the Move command:
• You may only move one source to one destination.
• All children (sub-items within a section) move with the parent.

The Copy and Move Data tool also allows the user to delete and rename items by highlighting the item and clicking Delete or Rename under the Source side. The EMS™ Query Tool can eliminate any data the user does not want to view, by the selection of Subset from the View box, and then Select. The Generate Selections and Respond to Selections checkboxes link the Copy and Move utility with the other selection tools. For all components of PAVER™ that use inventory items (Network, Branch, and Section), there is one active selection. Therefore, the user can use the Copy and Move utility to generate selections in other inventory selectors, or Copy and Move can be selected to respond to selections made by another selector.



Note
The user can delete from Source, but not from Destination.

Note
When using the Copy command:
• One source can be copied to one or more destinations.
• There is a choice to copy all children to the parent.

Data Verification Tools

The Database Verification Tools are a good place to start when encountering errors. They are now available as an Inventory option within the Visual Menu. Each checkbox represents a separate segment of the verification process:

(1) Verify branch data and remove duplicate section data: Ensures that branch summaries correspond to section totals, that only one family model is assigned to each section, and that there is only one set of user-defined field data for each section.

(2) Verify section construction history: Ensures the LCD (Last Construction Date) agrees with data in the Work History table.

(3) Verify/reset latest inspection indicators: Ensures data matches last inspection data.

(4) Check for duplicate Major M&R and duplicate inspections: Eliminates duplicate Major M&R (i.e. same date, same work type) and duplicate inspections (i.e. same section, same PCI).

(5) Verify work [required/history] descriptions: Ensures all work history and work required entries have a work type description. Reports sections and dates that have work codes no longer in the system tables.

(6) Verify inspection samples and cached inventory data: Ensures all sample units either have distresses or are marked “inspected but no distresses”. Checks and fixes cached inventory data associated with inspections.

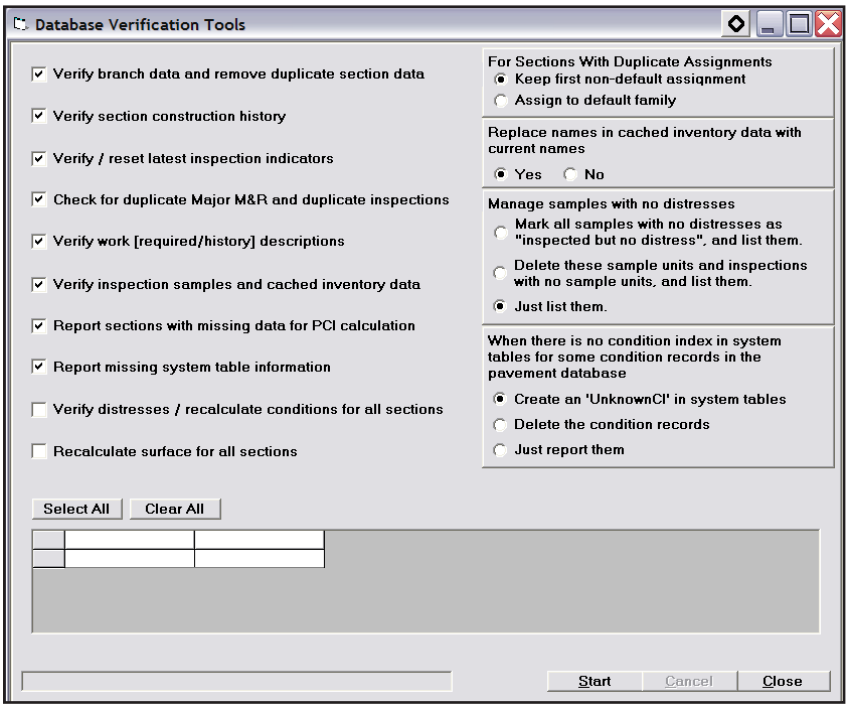
(7) Report sections with missing data for PCI calculation: Reports all sections missing data needed for PCI calculation.

(8) Report missing system table information: Lists networks, branches, and sections containing data that is missing from the System Tables.

(9) Verify distresses and recalculate conditions for all sections: Reports invalid or incomplete distress entries. Recalculates PCI and other selected distress indices (for large databases, this option may take considerable time).

(10) Recalculate surface for all sections: Ensures that the surface type (AAC, APC, PCC, etc.) for each section is correct according to the work history.

Select the Data Verification Tools to run, as well as any corresponding options, and then click Start. PAVER™ will run the selected Data Verification Tools and produce a verification report, listing all the sections that were altered and the associated actions carried out for each error.


Database Verification Tools
Verify branch data and remove duplicate section data
Verify section construction history
Verify / reset latest inspection indicators
Check for duplicate Major M&R and duplicate inspections
Verify work [required/history] descriptions
Verify inspection samples and cached inventory data
Report sections with missing data for PCI calculation
Report missing system table information
Verify distresses / recalculate conditions for all sections
Recalculate surface for all sections
For Sections With Duplicate Assignments
Keep first non-default assignment
Assign to default family
Replace names in cached inventory data with current names
Yes
No
Manage samples with no distresses
Mark all samples with no distresses as "inspected but no distress", and list them.
Delete these sample units and inspections with no sample units, and list them.
Just list them.
When there is no condition index in system tables for some condition records in the pavement database
Create an 'UnknownCI' in system tables
Delete the condition records
Just report them
Select All
Clear All
Start
Cancel
Close

EMS™ Image Viewer

The EMS™ Image Viewer manages the saving, recalling, viewing, and enhancing of pictures, drawings, and other stored images in the PAVER™ program. The EMS™ Image Viewer is accessed from the Inventory section of PAVER™ 6. The network, branch, and section cards of the Inventory program each have a button located along the bottom of the form labeled Images. In order to edit pictures for a specific network, branch or section, the item must be actively displayed in the inventory data window at this time. To open the EMS™ Image Viewer, click the Images button.

Note
Use the EMS™ Image Viewer to store relevant pictures, such as distresses or individual sections.

Store An Image

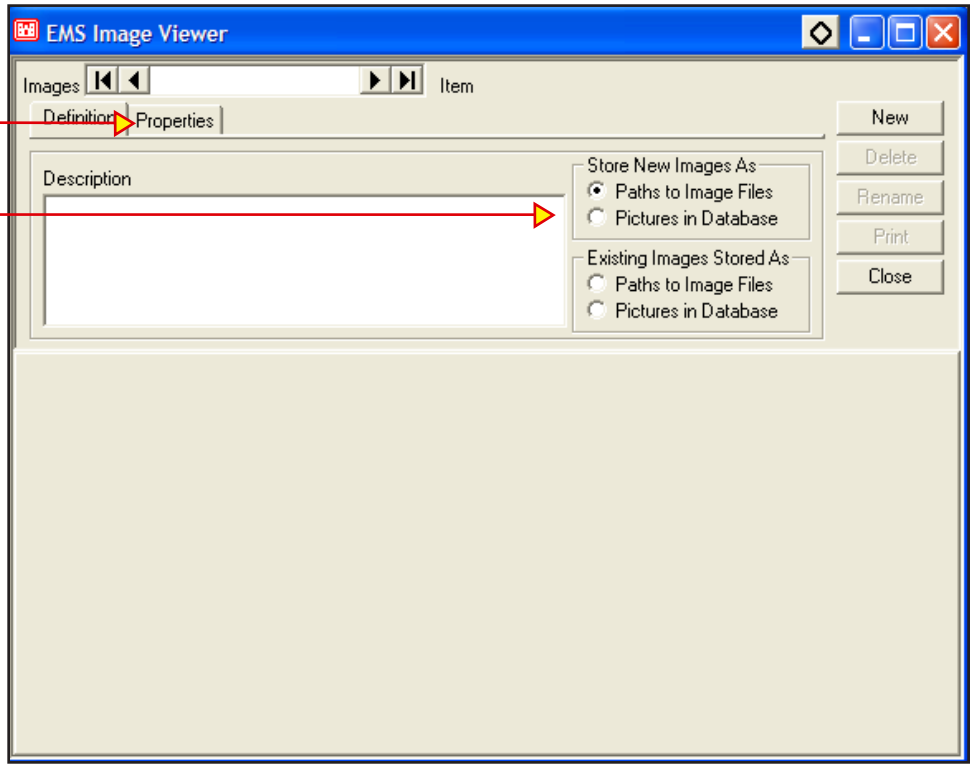
In the EMS™ Image Viewer window, there is a box titled Store New Images As. The options offered for storage are: Paths to Image Files or Pictures in Database. Since image files are typically large, including them in the database substantially increases the size of a database. An alternative is to attach the picture to the database through a path to the image. The image would be stored in a fixed location, and PAVER™ would simply set up a link to the image. However, an image stored as a path will not be included in the *.e65 file when the *.e65 is created for storage or transfer. In order for the images to follow the database, you will need to copy and send the images separately, making sure to place them in the same path on the new machine as they were in on the original. Select the appropriate storage option and click on the New button. You are prompted to select the file containing the picture

you wish to load. The drop-down list box at the bottom of the window is used to specify the format for the picture. PAVER™ supports images stored in *.JPG, *.TIF, *.GIF, *.BMP, *.TGA, *.PCX, and *.PCT formats. Once you have selected the image file to add, click Open and the image will appear in the EMS™ Image Viewer window.

If you wish to change the storage option for an image at a later time, select the image and change the selection in the box titled Existing Images Stored As.

Adjust images or add special effects

Edit how images are stored



View An Image

To view and select an image from the list of saved images, use the scrolling tool at the top of the window. If you add only one image for an inventory item, it always appears in the in EMS™ Image Viewer window when you access the EMS™ Image Viewer for that inventory item. However, you may associate more than one image with an inventory item. When multiple inventory images are associated with an inventory item, you can scroll through the images by clicking the image scroll buttons located on the upper left corner of the EMS™ Image Viewer window.

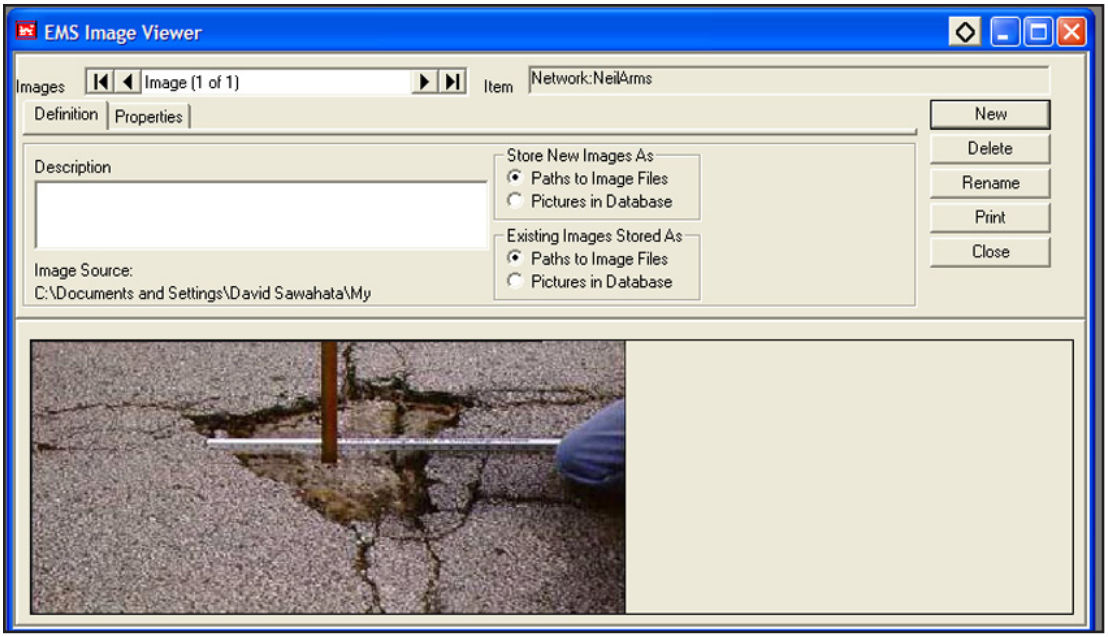
Edit An Image

There are two tabs in the EMS™ Image Viewer window: Definition and Properties. Clicking on the Definition tab allows the user to view the selected image and to determine how the image is stored. Clicking on the Properties tab allows for various graphic adjustments to the image as well as the addition of a variety of special effects. Click Edit for the desired feature, and then OK once you have made your adjustments. A preview of the image will be shown in the EMS™ Image Viewer window. Save changes by clicking Save Edits, or restore the original image if the change is undesirable by clicking Restore Image.

Other Image File Options

Five other commands are available in the EMS™ Image Viewer window:

- New: A new image is attached to the network, branch, or section that was active when the Image command was invoked.
- Delete: The current image in the viewer is deleted.
- Rename: Renames the image within the viewer, but does not change the file name.
- Print: Invokes the Windows Print window, to print the selected image.
- Close: Closes the EMS™ Image Viewer window.



6 Work

Work 61

Work

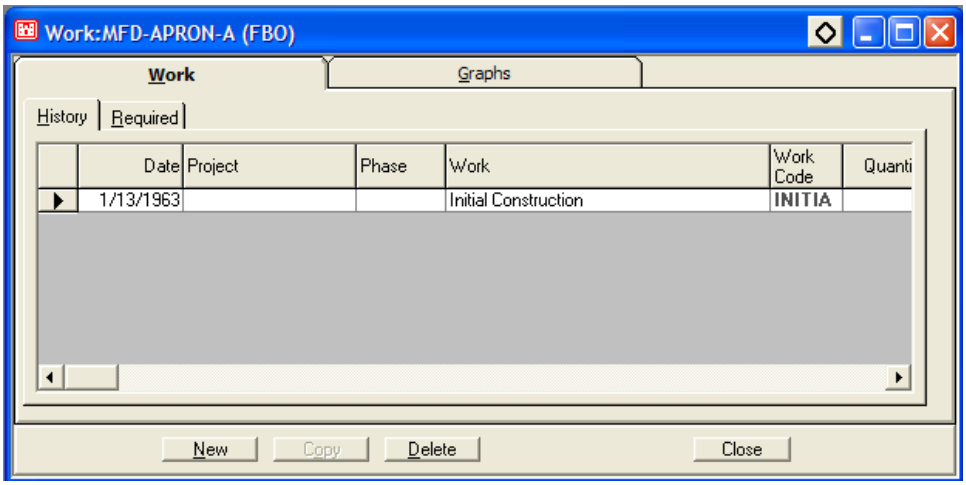
Extensive connections exist in PAVER™ between construction date and predicted PCI. The system must have an accurate account of the last construction date for each section, in order to accurately predict future pavement performance, maintenance requirements, cost, and inspection schedule. PAVER™ updates the last construction date for the section to correspond with the most recent major M&R. The History and Required forms provide an interface for easily entering work history data for a particular pavement section. In order to enter work information for a particular section, it must be selected in the Select Inventory Item window.

For a new record, click New and then enter the information either by typing or selecting from a drop-down list box of options. You may edit entries by typing over existing text. PAVER™ does not allow the user to delete ALL the construction dates in a work history profile, and if there is only one construction date the entry cannot be removed. Copy invokes the Copy and Move Data utility, which is used to move data elements to other compatible areas of the database. In this case, work records will be copied or moved.

Maintenance, repair, and construction activity information is recorded on the Work file card. The file card is subdivided into History and Required tables. Future or planned work is entered into the Required table. When the activity has been completed, scroll to the last column of the Required table and change the Work Completed field to "Yes". This causes the record to be transferred to the History tab, and when the table refreshes, the completed work activity will then be part of the work history.

Note
*Work quantities should be entered as positive values, **except** for cold milling, which is a negative value.*

The Graphs tab also contains a graphic component which presents graphs for each section, relating condition to work history.



7 Inspections/Conditions

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PCI And Distress Indices

Collection and recording of field inspection data are among the most frequently repeated tasks in PAVER™. The Inspection component of PAVER™ can be launched from Visual Menu >> Inspection/ Conditions >> PCI and Distress Indices. The PCI button on the PAVER™ Button Bar also launches the inspection component of PAVER™.

Entering Inspection Dates And Samples

To enter inspection information, first verify that the desired network/branch/section is selected using the Select Inventory Item window. Notice that the name of the window corresponds to the network/ branch/section that is currently selected. The Inspection Date drop-down list box allows the user to select a previous inspection according to its inspection date, which is useful if the user needs to add or edit information for a previous inspection. To enter information for a new inspection, click Edit next to the Inspection Date window. The Inspections window appears, displaying a list of past inspections. Click New and a new inspection, with the current date, appears at the top of the list.

When you first create a new inspection date, the new inspection has the same sample information as the previous inspection. If the actual inspection date is different, click on the date and edit it. Other fields in the window, including entering a comment for the inspection, may be edited. When the inspection date and other fields are as desired, click Close to return to the Inspection Data Entry window (the most recent inspection will be the currently selected one).

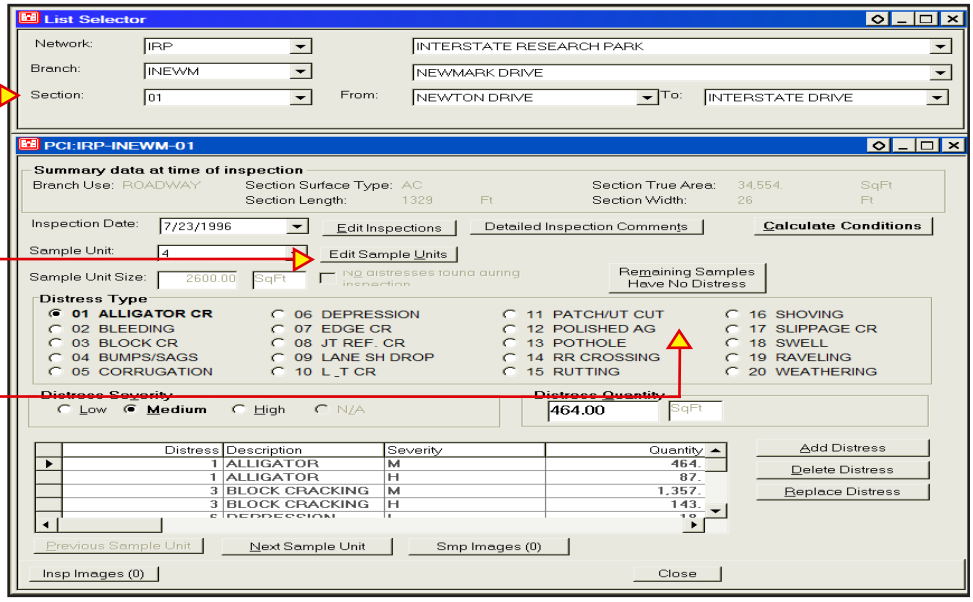
Note
Distress information entered into PAVER™ is associated with a specific date.

To enter comments for an inspection date, click the Detailed Inspection Comments box and enter a comment, which is stored with that inspection date. To view the comments for a given date, select the date in the Inspection Date window and click the Detailed Inspection Comments box.

Select Inventory Item window

Create a new inspection

Remaining Samples Have No Distress

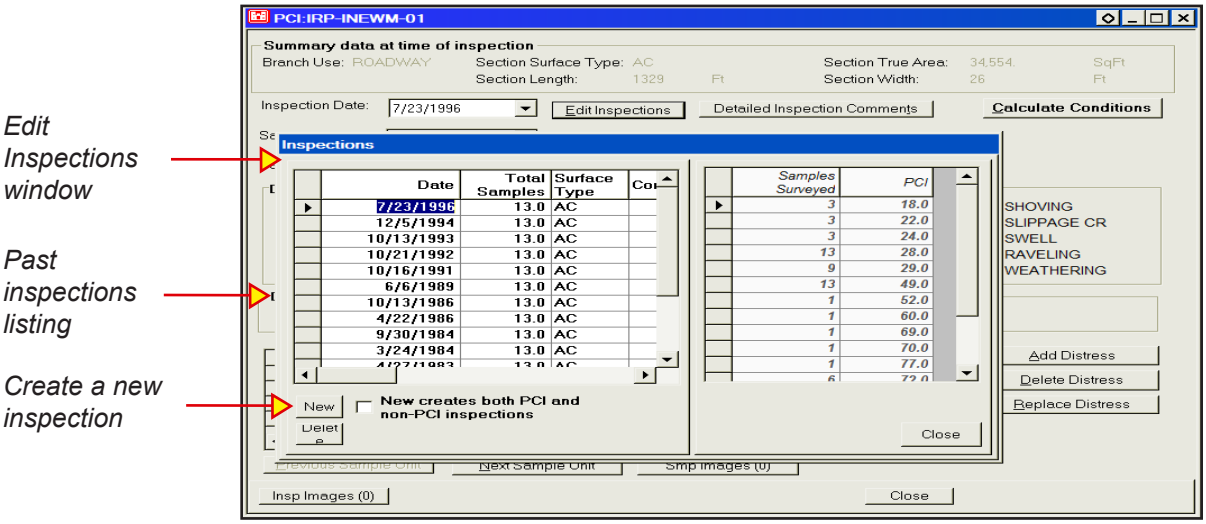


While the user can inspect each section in its entirety, it is not practical to do so, and it is acceptable to inspect only portions of a section. PAVER™ utilizes sampling techniques for performing inspections, whereby each section is divided into smaller pieces called sample units. Inspection information is then collected from one or more sample units.

The PAVER™ Inspection Data Entry window matches the field inspection and allows the user to enter survey information. Click Edit Sample Units, next to the Sample Unit window, to bring up the Select Samples window, which contains two lists. The left side shows the samples to be included in this inspection, and the right side shows samples that were used in previous inspections. To use a sample defined in a previous inspection, click the sample and then click the arrow button located between the two lists.

To add a completely new sample, click Add New, and a sample is added to the end of the list, with a Sample Number of "New" and a Sample Size of "zero". Click on the Sample Number field and change the ID to the sample ID used in the actual field inspection. The user may enter a comment for the sample and switch the Sample Type between Random (R) and Additional (A).

If there is a sample definition in the left-hand list that you do not wish to use, click the sample to be removed, then click Remove. If the sample already has inspection information (as can occur when editing the sample list for an existing inspection), PAVER™ informs the user that the sample already contains information, and asks the user to confirm that they really wish to delete the sample, as well as any inspection information within the sample.



Entering Inspection Information

The PAVER™ Inspection Data Entry window is designed to be easy to use and to allow experienced users to rapidly enter large amounts of inspection data. It is possible for the user to enter all inspection information for an entire section using only the keyboard.

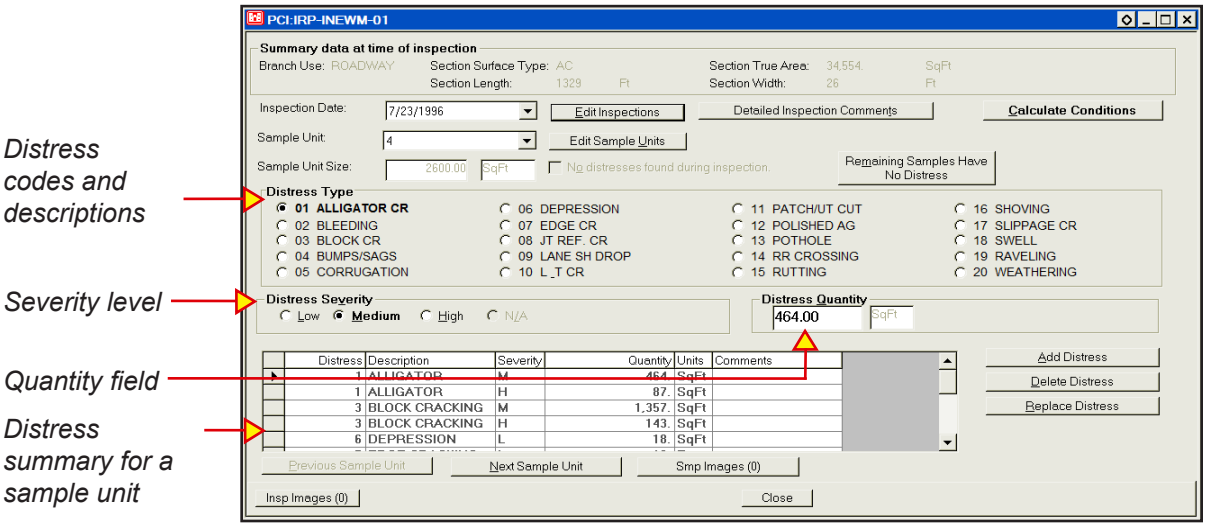
Once the section is selected and the inspection date and samples are set up, the user is ready to enter individual distresses. Select the Distress Type and desired Distress Severity level, and then enter the Distress Quantity. Note that the distress codes available in the list depend on the type of pavement inspected, since some distresses are only found on a particular surface. PAVER™ likewise modifies the available Distress Severity levels, as some distresses cannot be assigned a severity level. If no distresses were recorded for a sample, select No distresses found during inspection checkbox. For PAVER™ to calculate the PCI or condition for a section, all samples created must have at least one distress or be identified as No distresses found during inspection. If you finish entering the inspection information and there are undefined samples with no distresses, click the Remaining Samples Have No Distress

Note
You may enter duplicate distress types and severities. For example:
Alligator L 50
Alligator L 40

button and PAVER™ will assign them as so. The Database Verification Tools can be utilized to easily verify inspection samples and manage samples with no distresses (see Chapter 5 Inventory >> Data Verification Tools).

After you have entered the Distress Type, Distress Severity, and Distress Quantity, click Add Distress to add the distress to the list. To delete an existing distress from the list, highlight a row and click Delete Distress. The Replace Distress button deletes the highlighted record and replaces that information with the current Distress Type/ Distress Severity/ Distress Quantity information. If you wish to enter a comment for the distress, click the Section Comments button in the list of distresses.

Once you have entered inspection data for an entire sample, proceed to the next sample in the list by choosing another sample from the Sample Unit drop-down list box. Review previously entered data by using the Sample Unit drop-down list box.



For Maximum Speed - Keyboard Only

The most repetitive part of inspection data entry is inputting the distress data. Once familiar with the PAVER™ Inspection Data Entry window, distress data entry can be performed completely on the keyboard.

To perform keyboard-only data entry, first set up the inspection and sample information as described in the previous section. All distress codes are two-digit numbers shown to the left of the Distress Type. To enter “Bleeding”, for example, type the two-digit code “02.” A rectangle appears around the code and description. You may change the distress selected by typing a different code, or by moving the selection rectangle with the arrow keys.

Select the proper Distress Severity by typing “L” for Low, “M” for Medium, and “H” for High. Once you enter a Distress Severity, the cursor immediately moves to the Distress Quantity field where you can type in the distress quantity. Note that the entire Distress Quantity field is highlighted, meaning that anything in the box is immediately overwritten by what you type. If the distress has no severity level, then the Low, Medium, and High options are disabled (gray). To skip the distress severity, press the Tab key twice. The cursor skips first to the N/A option, then to the Distress Quantity field.

Once you have typed in a distress quantity, add the distress to the list by typing “A” for Add, or by pressing the Enter key. A new row is created in the list of distresses and a short beep lets you know the data has been entered.

To enter a comment, use the mouse to click on the Comments field in the list of distresses entered, and type in the comment. When finished, click on the next distress code and resume keyboard-only entry.

When you are finished entering all the distresses for a sample, move to the next sample by typing "N" for Next, or move to a previous sample by typing "P" for Previous.

Batch Inspection Data Entry

To expedite inspection data entry, enter multiple inspection records at one time. A specified format is required for video inspection data, and two options exist for the importing of data. The first option requires six ASCII text files, the second option requires at least one of five tables in a Microsoft Access database. For specific format requirements, see Appendix B. After data is in the correct format and all files or tables are complete, begin the batch entry by selecting the option from the PAVER™ Add-ins menu.

Calculating The PCI After Inspection

An Assessment Results window allows the user to view the condition of an individual section immediately after distress data is entered. To access this window, click Calculate Conditions in the Inspection Data Entry window. The section properties are displayed at the top of the window. In the middle of the window, Condition Index, Inspection Date, and Condition Value are displayed. This window also gives you basic information about the section that you are viewing:

- Condition Indices: Displays the Condition Value for all conditions associated with the current section.
- Sample Distresses: Displays a sections inspected sample units and their corresponding distress codes, descriptions, severity, quantity, density, and deduct.
- Sample Conditions: The top displays a sections inspected sample units and the individual unit's sample type, size, and PCI. The bottom displays the number of samples surveyed and compares the total number of samples to the recommended number for a project level inspection.
- Section Extrapolated Distresses: Shows each distress type from the Sample Distresses tab. Distresses are aggregated based on type and severity level. For random samples, distress quantities are adjusted to reflect the extrapolated value based on the sections total area. For any additional samples, distress quantities are extrapolated based on the additional samples true area. Extrapolated distress deducts are classified as resulting from load, climate, or other. The Distress Classification portion of the tab shows the percent of extrapolated distress deduct belonging to load, climate, and other.

Again, right-clicking any table provides Print and Export options. There is also a Print button at the bottom of the window.

Other Conditions

User-editable Condition Indices

PAVER™ computes condition indices as well as the PCI value. Condition indices are defined and created in Tables >> Condition Tools >> Select Condition Types. On the Select Condition Types window there are three separate tabs: Numerical Condition Types, Textual Condition Types, and Distress Condition Types. These tabs represent user-defined condition indices that may be numerical, textual, or distress oriented. Condition indices can be edited using the Add or Delete buttons and manipulated individually inside the grid. These user-defined values can be assigned to sections in a data base via Visual Menu >> Inspection/ Condition >> Other Conditions.

Inspection Data Import (PAVER™ Database)

Copying Inspection Data

PAVER™ allows you to copy inspection data from one version of a database to another copy of the same database, using the Inspection Data Import (PAVER™ Database). The Inspection Data Import is useful if inspection data entry is split among coworkers, and is to be imported at a later time into one master database.

To start, make sure that the database to which you would like to import inspection data into is open, and click Visual Menu >> Inspection/ Conditions >> Inspection Data Import (PAVER™ Database). A window appears on the screen asking for the database file from which you wish to copy the inspection information. Once you have located the correct database file, another window appears asking which inspection dates you wish to import. Select the appropriate dates from the list and click Copy. After the data is processed a window will appear, letting the user know the inspection data import is complete.

Create Inspection Schedule

The Inspection Schedule report selects sections for inspection, subject to minimum condition criteria or projected deterioration rates, and operates like the Condition Analysis and M&R Work Plan reports. When the report is opened, the user may configure the parameters of the report and then execute the report. The completed report is presented in the Report Viewer.

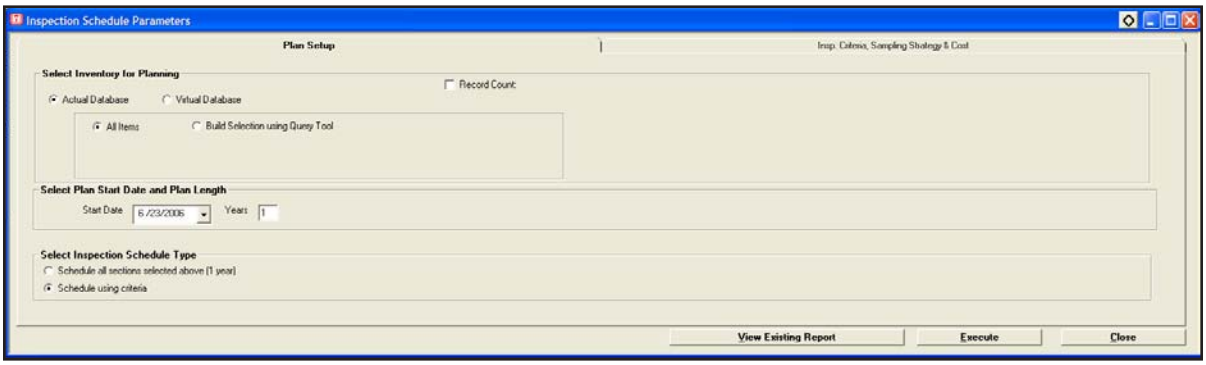
Start the Inspection Schedule report by choosing Visual Menu >> Inspection/ Conditions >> Create Inspection Schedule. Select either the actual database or a virtual database to include in the report on the Plan Setup tab, under Select Inventory for Planning. To select all items from the database, choose All Items. To select a subset of the database using the EMS™ Query Tool, choose Build Selection using Query Tool, then click Edit Selection.

The Select Plan Start Date and Plan Length portion of the Plan Setup tab is used to specify the scheduling period, when Schedule using criteria is highlighted under Select Inspection Schedule Type. Otherwise, Schedule all sections selected above is highlighted, specifying a complete inspection.

The Insp. Criteria, Sampling Strategy & Cost tab, allows the user to specify Sampling Strategy and Inspection Expenses per sample unit, when Schedule all sections selected above is highlighted on the Plan Setup tab. Select the Sampling Strategy for the determination of the number of samples

to inspect for each section. The Inspection Expenses per sample unit will be used to calculate the inspection cost for each section.

If Schedule using criteria is chosen on the Plan Setup tab, then on the Insp. Criteria, Sampling Strategy & Cost tab, the user additionally specifies the Minimum Condition and Deterioration Rate. Use the checkboxes to enable or disable each option, which may be run together or separately.

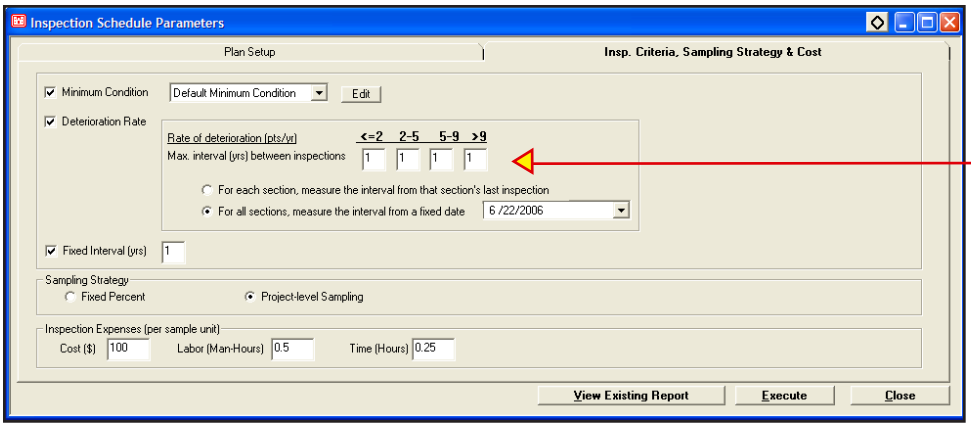


The user may choose to schedule inspections according to a table of minimum acceptable conditions. If the Minimum Condition box is checked, projected section conditions are compared to a list of minimum conditions, and a section is only scheduled for inspection if that section's condition falls below the matching record in the minimum condition table. When the Minimum Condition alternative is selected, the user may specify a minimum condition table. Use the drop-down list box immediately to the right of the Minimum Condition checkbox, to select a table of acceptable minimum conditions. The Edit button can be used to review and edit the selected minimum condition table. The tables are arranged with an associated Minimum Condition for each Year.

If the Deterioration Rate box is selected, the user is able to configure the relationship between deterioration and inspection frequency. PAVER™ checks the rate of deterioration for a section included in the report, and categorizes it based on the numbers placed in each Rate of deterioration category.

Select the Sampling Strategy for the determination of the number of samples to inspect for each section, and enter in the Inspection Expenses (per sample unit) data which will be used to calculate the inspection cost for each section.

Run the Inspection Schedule report by clicking Execute. The Inspection Schedule report is presented in the EMS™ Report Viewer with the default view as a summary of inspections per year. To obtain a version of the report that lists the individual sections inspected for each year of the report period, click Go to Detail. When closing the report, PAVER™ will ask you if you want to save it. If you save the plan, it will create a file name of your choice with a *.rpi extension.



Open Saved Inspection Schedule

This utility is accessed under Visual Menu >> Inspection/ Conditions >> Open Saved Inspection Schedule. Navigate to the directory where you saved the inspection schedule as a *.rpi file, and double-click the file name to open the saved schedule in the same view as when you originally created it.

8 Reports

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Summary Charts

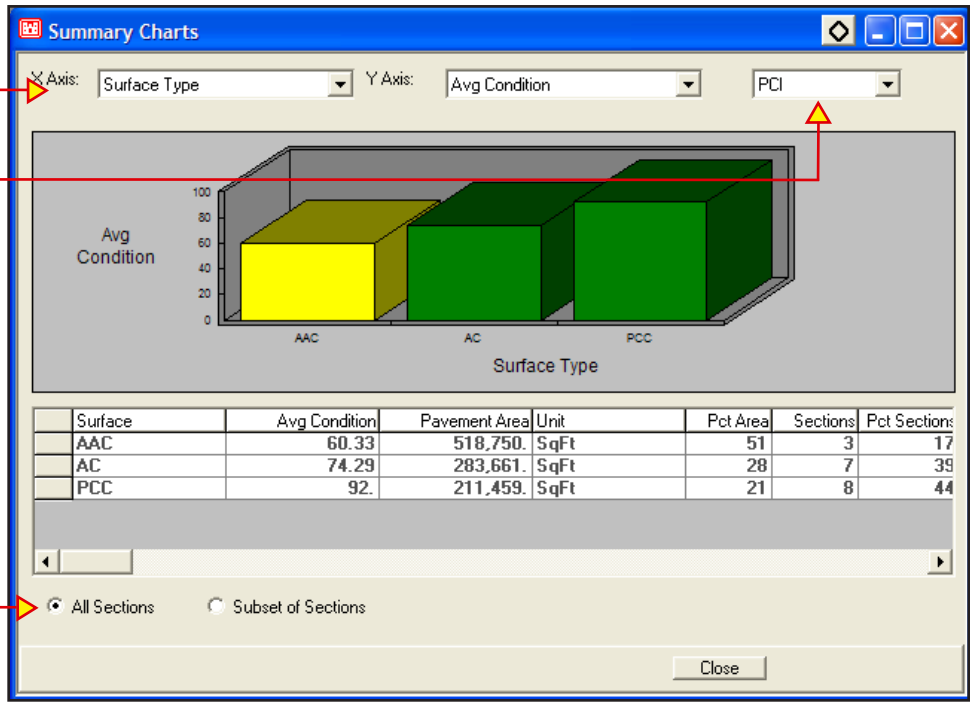
Summary Charts are a feature designed to allow you to graph and compare any two attributes of a database. For example, you can view the average condition of your network based on surface type. To access the Inventory Summary Charts select Visual Menu >> Reports >> Summary Charts. The Summary Charts window appears and awaits the users selection of a category to represent the X- and Y-axis. Using the drop-down list boxes labeled X-Axis and Y-Axis, select an X-Axis for the graph you wish to produce. The drop-down list box for the Y-Axis selections is hidden until the user makes a selection for the X-axis. The third drop-down list box requests that the user makes a selection of which condition index they wish to use. For the charts to work properly, the user must have condition data available for the index they have selected. PAVER™ automatically associates a PCI with every section in the users database. Every other index requires that the user either input the value manually or establish a definition for the index (see Chapter 7 Inspection/ Conditions >> Other Conditions >> User-Editable Condition Indices).

After the user has made valid selections, the graph and data table will populate. Some combinations may produce a null set of sections and hence no graph. Dragging the border of the table at the bottom of the page, can modify the field widths. Right-clicking on the table presents the Print and Export options for the table.

Define graph axes

Select the Condition Type to display

Choose All Sections or define a Subset of Sections



Standard Reports

There are four Standard Reports accessed through Visual Menu >> Reports: Branch Listing, Work History, Branch Condition, and Section Condition Reports.

- Branch Listing Report: Produces a list of all branches and associated information including usage, number of sections, total area, etc. The last page is a summary of all branches in the network(s).

- Work History Report: Produces a section by section report of all work completed within that section over the life of the database, and includes data such as work type, work date, and cost.
- Branch Condition Report: Displays the average and weighted average condition of each branch, including standard deviations as well as a summary of all branches on the last page.
- Section Condition Report: The same as the Branch Condition Report except the data is displayed at the section level. A summary is included on the last page of the report.

Define the subset of the database you wish to run the report on by clicking on Selection Criteria. The subset can range from one section to the entire database, which is the default if Selection Criteria is not established. Clicking on Selection Criteria opens the EMS™ Query Tool.

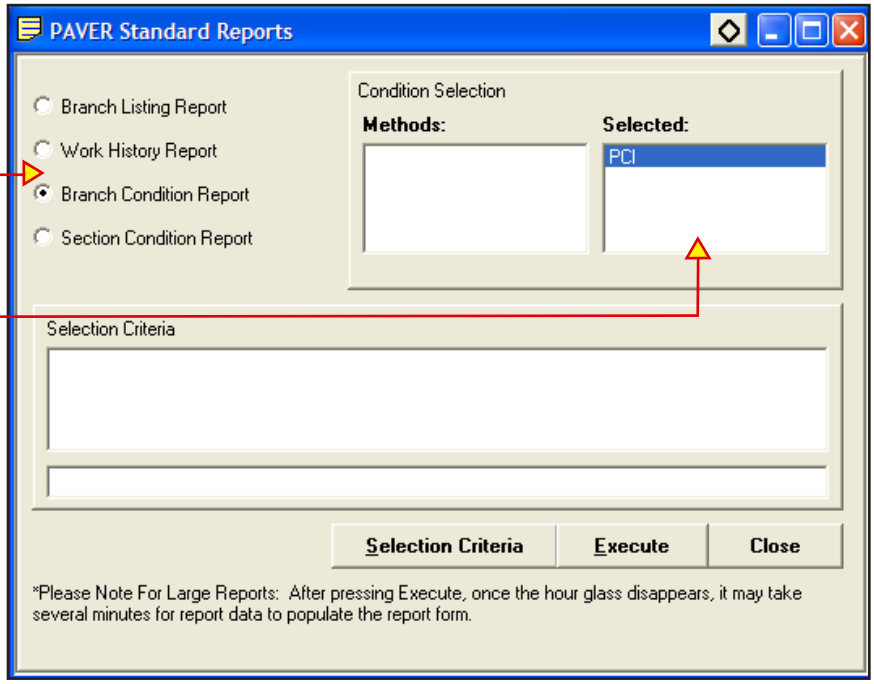
Before the Branch and Section Condition Reports can be executed the user must select which condition index to use. This is done by double-clicking on the desired condition, in the Condition Selection box, under Methods. This places that condition type in the Selected window, at which point execution of the report can continue. To deselect an item in the Selected box, double-click on it to send it back to the Methods box. Only one condition index can be used per report.

Note
For Standard Reports, there is no Order Rows tab in the EMS™ Query Tool, since reports are created in a standard layout.

On the top of each of the reports is a tool bar, which is used to manipulate the report. Left and right arrow buttons are used to go forward and backward through the report. In between the arrows is a display of the current page and the total number of pages in the report. There is a print button and an export button to send the report to a printer or to a file, and a view size drop-down list box allows the user to size the report for easier viewing.

Select the desired report type

Double-click the desired Condition Index



User-defined Report

The user-defined reporting tool gives the user the ability to create their own report, and display it in table form, which can then be printed or exported to another application (such as Microsoft Excel). As with other tables in PAVER™, right-clicking displays the print and export options menu.

The EMS™ User-defined Reports Tool can be accessed under Visual Menu >> Reports >> User-defined Reports, and offers three options: display a Memorized Report, Create New Report, and Edit Current Report.

Display A Memorized Report

This is a report that the user has created and saved. It is available from the picklist at the top of the window, and regenerates each time the user selects it, so all displayed information is current.

Create New Report

Click Create New Report to display the EMS™ User-defined Reports Definition window. On the left of the definition window, there is a tree that reflects the database structure. On the right there is a window with three tabs. Use the tree on the left of the window to select a component of the hierarchy that contains the data elements that you would like displayed in your report. All associated elements are displayed in the left window of the Select Columns tab. Scroll through the various levels of the tree on the left of the window, to see which elements are associated with the different levels of the inventory structure.

Note
Selected Rows determines which records will be included in the table. Selected Columns determines what data from each record is displayed.

Select Columns requires the user to specify the data items that are displayed in each column. Select individual components and move them to the window on the right. All elements in this window become the column headers for the report. Only the elements the user selects from the center window and moves to the right, are integrated into the report.

Select Rows invokes the EMS™ Query Tool and allows the user to build the selection. The Order Rows tab allows for the sorting of the records in the table.

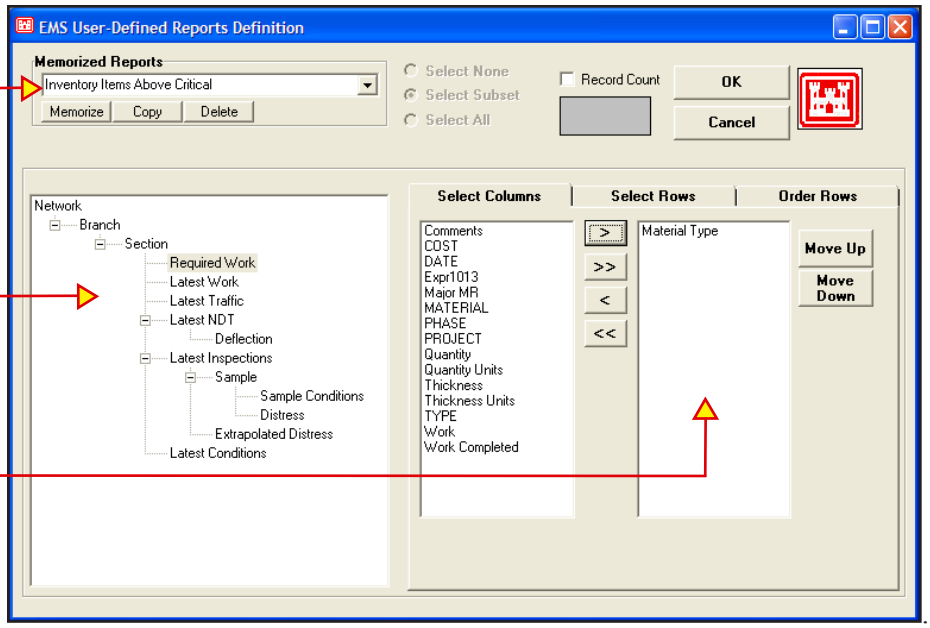
In between the two windows of the Selected Columns tab and the Order Rows tab, there are two types of arrows. Double arrows move all items in the window, and single arrows only move the selected item. If you choose to deselect an item, move it back to the left box and it is removed from the list. The Move Up and Move Down buttons allow the user to position the selected components in the desired order. The Change Order button, in the Order Rows tab, changes between ascending and descending orders for the selected components.

The New, Copy, Save, Edit, and Delete buttons, located in the top left of the window, become available to perform the corresponding actions as the circumstances allow. Previously saved formats are in the Memorized Reports drop-down list box.

Store criteria to be used again as a Memorized Report

Navigate through inventory components for data categories

Columns to be included in the report



Edit Current Report

The first step to editing a report is to select the desired report from the drop-down list box at the top of the Edit window. From here, the format is the same as in the Create New Report options. When editing is complete, the changes take effect immediately, and are reflected the next time the report is ran.

To Run a report, select the report from the drop-down list box at the EMS™ User-defined Reports Tool window, and the populated table appears. The report generates at the moment of selection, so all data is current.

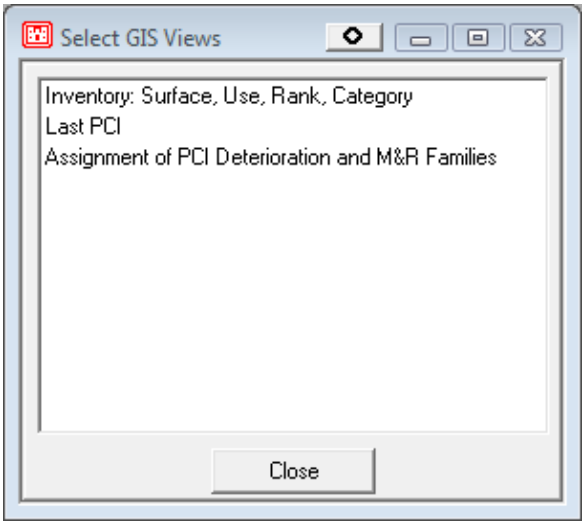
GIS Reports

The GIS Reports are a series of preset views that allow the user to see a variety of information about their database in a graphical display. These reports require that a shapefile be linked to the PAVER™ database (see Chapter 14 GIS Tools for details on linking). Viewing a GIS Report effectively creates a shapefile, with the PAVER™ data pertaining to the GIS Report view populating the shapefile's attribute table. For more information on accessing these individual report shapefiles, see Chapter 14 GIS Tools.

The views are grouped into 3 sections: Inventory, Last PCI, and Assignment Of PCI Deterioration And M&R Families. To navigate these views, use the GIS Viewer Buttons, which function in the following manner:

- Center: Centers the current view at full extent
- Pan: Allows the user to move around the view at the current zoom level
- Select: Activates the selector tool so the user can utilize the GIS view as an inventory selector
- Zoom Area: Allows the selection of a portion of the view to zoom in on
- Zoom In: Zooms in one level on the current view

- Zoom Out: Zooms out one level on the current view
- Print: Prints a copy of the view and the legend

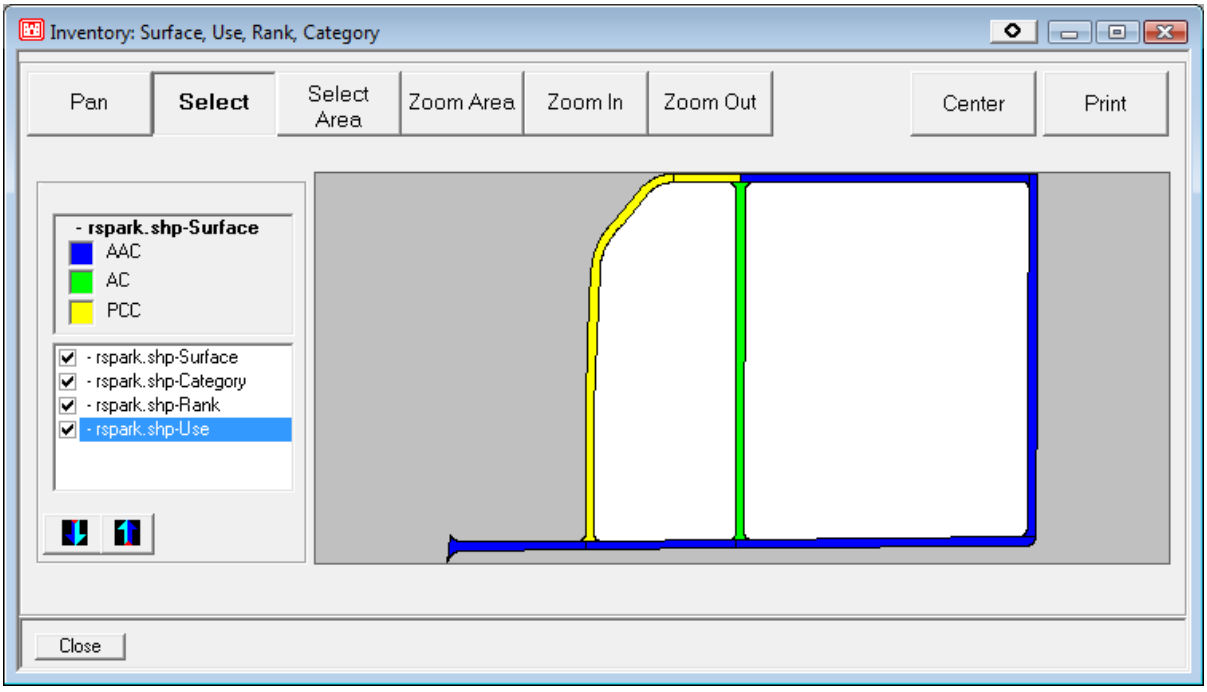


Inventory

The Inventory GIS view consists of four distinct layers:

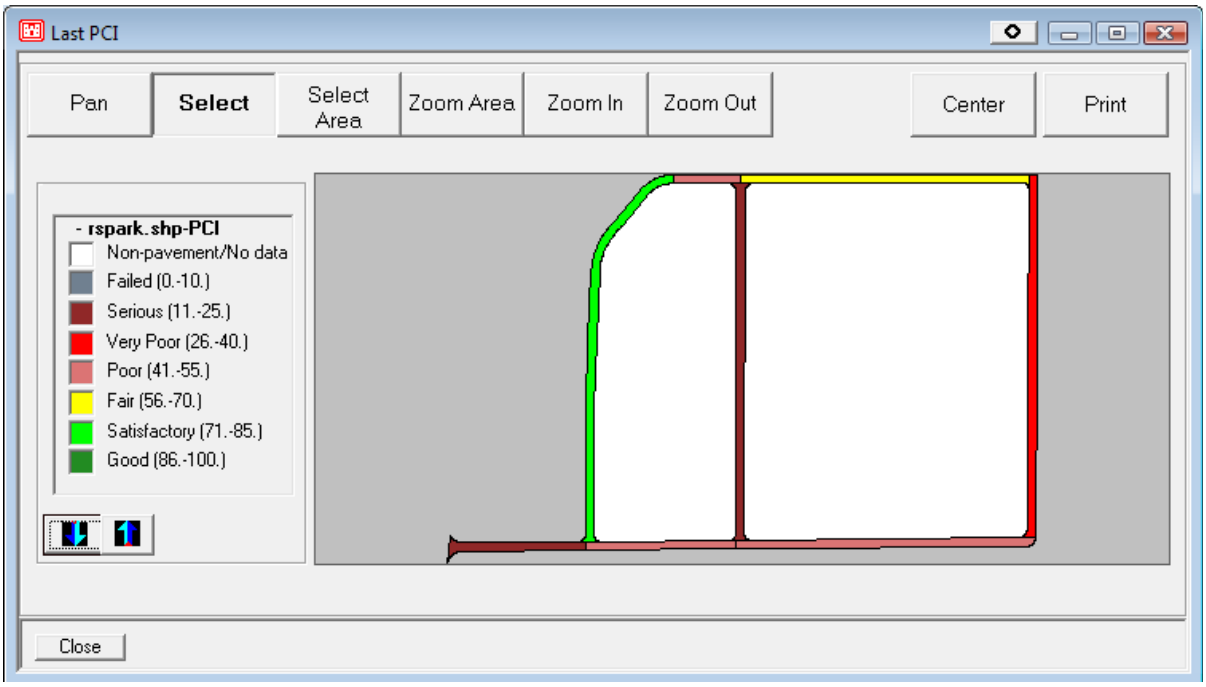
- Surface Type
- Category
- Rank
- Branch Use

The categories and associated color schemes in these views are preset and cannot be changed. Since the Inventory view has four layers, only the top-most checked layer will be displayed. Each layer name has a checkbox next to it. If only one box is checked, then only that layer displays. If more than one layer is checked, the layer that is highest in location on the list displays. The up and down arrows under the layers box can be used to move layers up or down on the list. Highlight a layer and use the arrows to move it to a different location in the list.



Last PCI

This view displays the current/ latest PCI value for each section in the view. The PCI value comes from the last inspection date (or last major M&R activity date). Going to Tables from the menu bar, and selecting Condition Tools and Define Condition and Age Categories, can define the categories and range of values, as well as associated GIS and graph colors. In this table, on the Condition Categories tab, select PCI in the Name drop-down list box to make new categories, change names, assign numeric ranges, and manipulate color schemes.

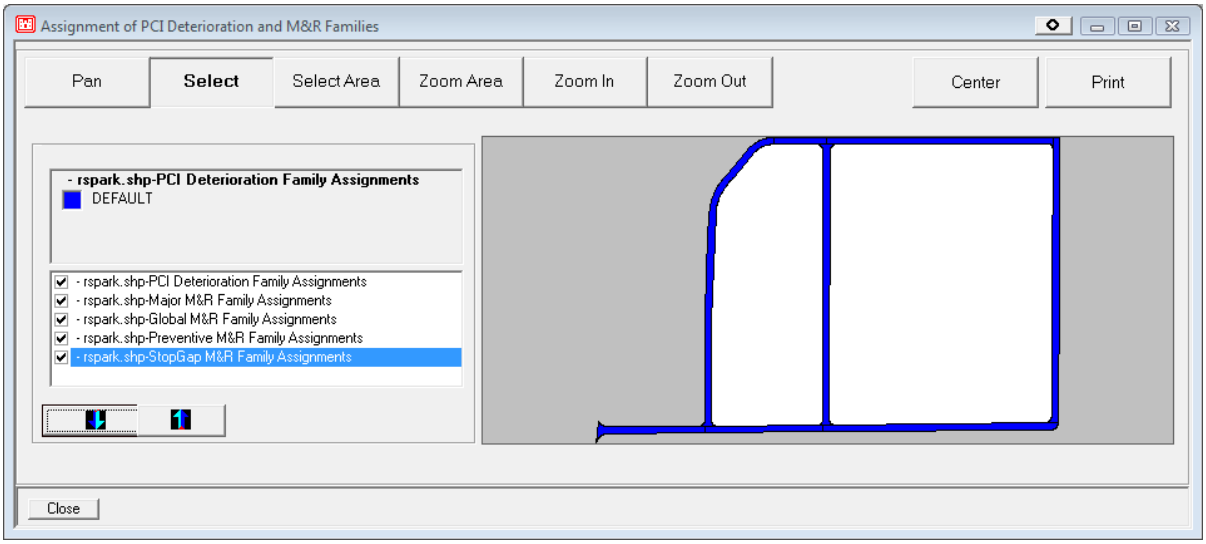


Assignment Of PCI Deterioration And M&R Families

The Assignment Of PCI Deterioration And M&R Families GIS view consists of five distinct layers:

- PCI Deterioration Family Assignments
- Major M&R Family Assignments
- Global M&R Family Assignments
- Preventive M&R Family Assignments
- StopGap M&R Family Assignments

As in the Inventory GIS view, the top-most checked layer has priority in the display. Highlight a layer and use the arrows to move it to a different location in the list and thus change its priority or display rank.



9 Condition Prediction Model

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Create And Maintain Prediction Models

Building Family Models

The prediction modeling (family modeling) process identify's and groups pavements of similar construction, that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. The historical data on pavement condition can be used to build a model which can accurately predict the future performance of a group of pavements with similar attributes. In PAVER™, this model of a pavement's life is referred to as a "family".

Each pavement section is assigned a family. When predictions about the future performance of a pavement are desired, its family model is used to predict its future condition. If the user has not assigned a family model to a section, its default family is used to predict future pavement performance. Assigning sections to a PCI deterioration Family is discussed in Chapter 10 Condition Model Family Assignment.

Factors such as original construction, maintenance, weather, and traffic, greatly affect the life of a pavement. A generic guess or assignment to the default family is not likely to be as accurate as a model that takes these factors into consideration. The Prediction Model is designed to allow users to blend unique knowledge about their pavements, measured local condition information, and powerful modeling tools, together to produce highly accurate estimates of future pavement life.

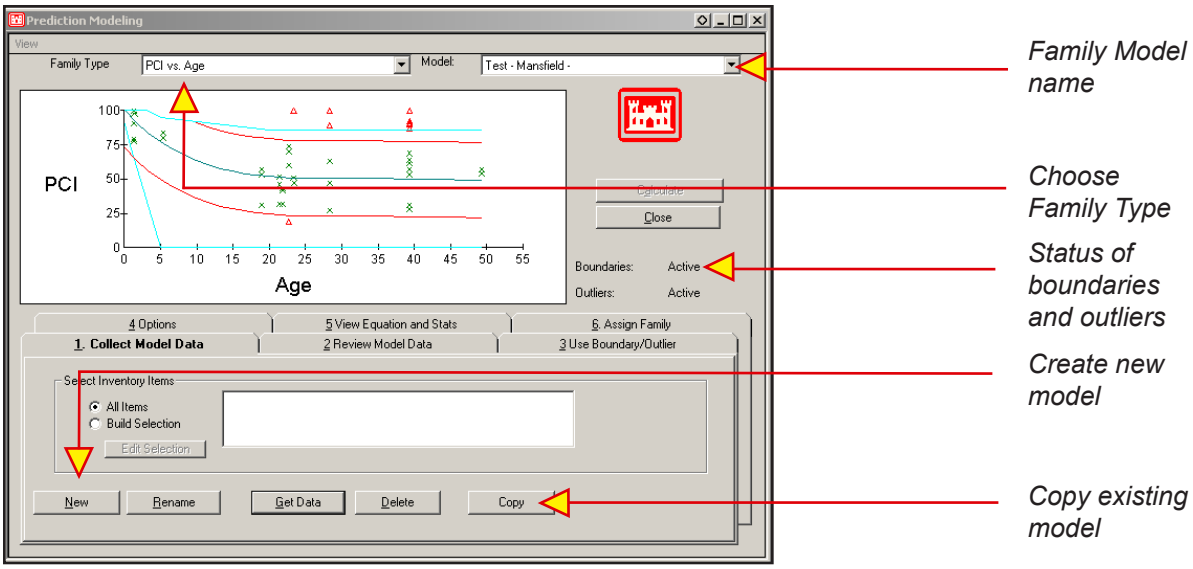
Using The Prediction Model

Note
When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.

Choose Visual Menu >> Condition Prediction Model >> Create and Maintain Prediction Models to display the Prediction Modeling window. The Prediction Modeling window can also be reached by clicking on the Prediction Modeling button on the PAVER™ Button Bar. The top-half of the Prediction Modeling window is a graph that shows a sample start-up prediction model. Two drop-down list boxes are located above the prediction model graph. By clicking the drop-down arrow on the right side of these boxes, the user can select a Family Type as well as a previously saved Prediction Model. Select a Model from the list, and PAVER™ loads all the data points used to build the model, and the settings used to generate the model. It then plots the data points and the estimated condition prediction function.

The upper right corner of the Prediction Modeling form contains two buttons: Calculate and Close. The Calculate button causes the model to estimate the condition prediction function and plot the curve through the data points. The Close button closes the Prediction Modeling window. Any models you have built are automatically saved when the Close button is clicked. The prediction model plot operates like other PAVER™ graphs, where right-clicking on the graph displays the extended graphing features menu.

Located just below the Close button are the Boundaries and Outliers status indicators. Once a model is selected or created, the Boundaries and Outliers status indicators are activated. These indicators report the status of the boundary data filter located on card 3. Use Boundary/Outlier, and the statistical outlier analysis feature that is configured on card 4. Options. These options, and all other family model building variables, are configured on the index card style data entry forms located on the lower half of the Prediction Modeling form.



Collect Model Data

This form is used to collect data from the active PAVER™ database and to build a new family model or adjust an existing family model. To create a new model, click New. You are prompted to provide a name for the new family model being created (entries may be up to 16 characters in length). After naming the family model click OK and the EMS™ Query Tool is presented so that you may select a subset, if desired, of the active database. After selecting the filter criteria (which can be none), the age verses condition points for the pavement sections selected are placed in the grid on the Review Model Data card, as well as displayed on the graph.

Note
When a prediction model is created, only data points that are at least one year old are used.

The Get Data button at the bottom of the Collect Model Data card is used to modify the data used in an existing family model. After clicking Get Data, the user is prompted to overwrite the existing model data, append to (add to) the existing data, or abort the get data operation. Copy creates a new model based on the family model that was active when the Copy button was clicked. To change the name of the model, click Rename, and to delete the active model, click Delete.

Review Model Data

This card presents data used to create the family model. Like other tables in PAVER™, the extended features can be accessed by right-clicking on the table. The Status column contains no entry for records that are used to calculate the condition prediction curve. Points that are removed from the prediction process by boundary conditions or outlier analysis, are labeled as “Out of Range” or “Outlier” points. You can add points to this table if you wish to influence the curve in a particular area. If any records are added or deleted, you must recalculate to refresh the graph.

Note
Points can be added to the Review Model Data table, to influence the model curve. When entering data, only enter Age and PCI values.

Use Boundary/Outlier

Upper and lower model boundaries are specified on the Use Boundary/Outlier card. Age vs. PCI points that fall outside the boundaries are marked as “Out of Range” in the Review Model Data table,

and are not considered when the predicted condition function is estimated. Points marked as "Out of Range" can be reintroduced into the analysis by turning off the boundaries or shifting the location of the boundaries so those points are in the allowable range. The X Range Filter is used to specify a range on the x-axis from which you want to include data. Data points outside the specified range are ignored.

Note
To edit Use Boundary/ Outlier or Collect Model Data tabs, make sure the checkbox next Prevent Changes to Model, in the Options tab, is unchecked.

Model Boundary Filter are adjusted by changing the values in the table on the Use Boundary/Outlier card. To edit or change a value, highlight the row in the table you want to change, and then select the column you wish to edit (year, lower or upper bound) and type the new value (numeric entries only).

New rows can also be added to the table with the right-click menu. The Add option inserts a blank row in the last row of the boundary data table. Records in the Boundary Filter data table are sorted in ascending order by age (year). Edited and new records are out of order until the model is recalculated. If any new information is entered that differs from the current model, the Calculate button will be activated. After the model is recalculated, the boundary table entries will be in the proper sort order.

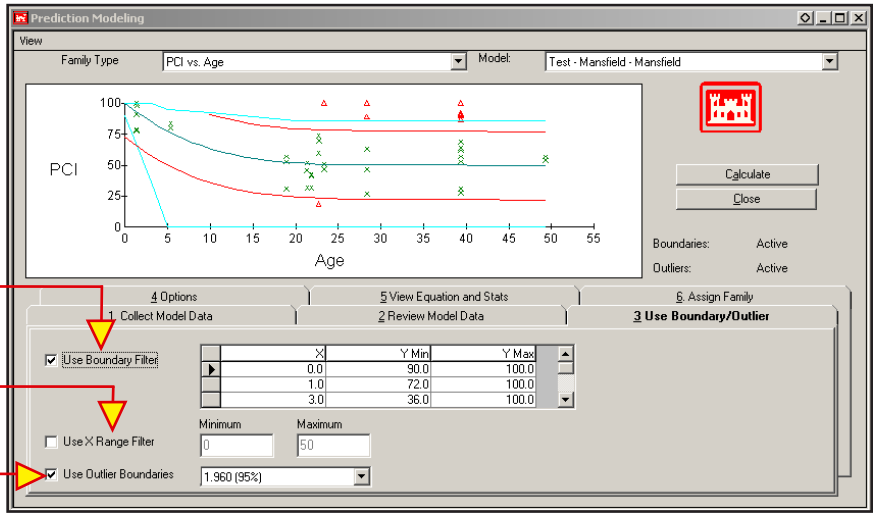
The outlier boundaries are used to limit the number of data points used in the computation of the curve. Options for outlier constraints range from 50 to 100 percent. Changing these various options and recalculating, produces different curve results. Use tab 5. View Equation and Stats, to determine the statistical soundness of your curve.

Note
To add or delete rows of boundary data, right-click on the table.

Adjust Model boundaries

Set X Range Filters

Set Outlier Boundaries



Options

The Options card is the heart of the statistical analysis performed in the prediction modeling tool. In the "Slope" section, the user can choose to constrain the curve upward or downward, or to leave it unconstrained. Set the critical PCI for all sections assigned to this model by entering the value in the "Critical Condition" window. To prevent changes to the model select the checkbox associated with the label Prevent Changes to the Model.

View Equation And Stats

The View Equations and Stats card displays the intercept and coefficient values for the equation estimated to be the best fit for the data. The card also lists various "goodness-of-fit" statistics for the estimated model.

Assign Family

The Assign Family tab allows individual sections to be assigned to the prediction models they created. Sections assigned to a prediction model curve make up a family. To assign the entire family of sections used to create the prediction curve, select Assign Family to Sections. After this selection, all of the sections will be listed on this card. To unassign any section from a family, highlight the section in the table and select Unassign Family from Selected Section. The Family Assignment tool is described in detail in Chapter 10 Condition Model Family Assignment.

Other Condition Prediction Model Features

When the Prediction Model is open, a View menu appears at the top of the window, allowing the user to turn on and off various graphing features, including Calculated Curve, X Range, Boundaries, Outliers, Good Points, and Bad Points. These features only affect the view of the data and not the underlying statistical routines. For example, if you use the view menu to turn off the boundaries, the boundaries do not appear on the plot of the graph. However, points in the model that do not meet the boundary conditions are still excluded from the modeling process.

10 Condition Model Family Assignment

Assign PCI Deterioration Families 84

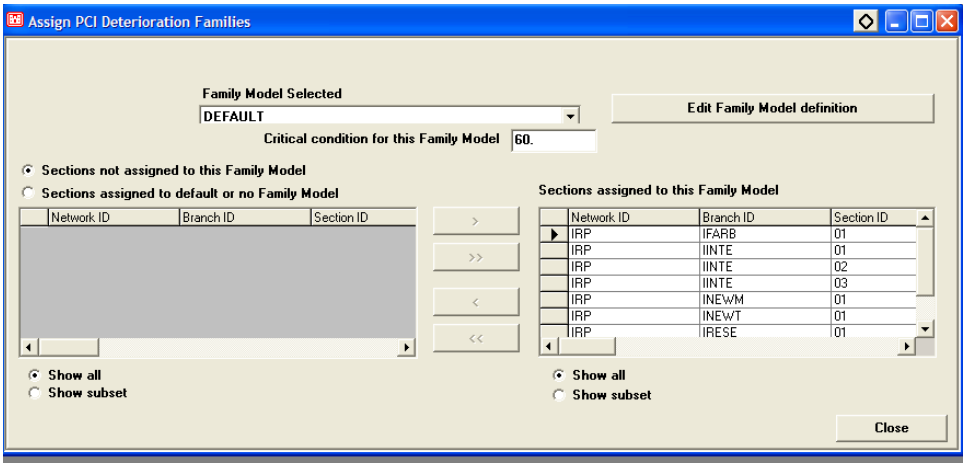
Deterioration Families 84

Assign Family 84

Assign PCI Deterioration Families

Deterioration Families

A Deterioration Family is a group of pavement sections that are subjected to similar traffic patterns, weather, and other factors that affect pavement life. In the previous chapter, we built Prediction Models to predict the future performance of a group of pavements that possess similar attributes. Now that we have developed the deterioration curves, we need to assign individual pavement sections to their corresponding curves. As was mentioned in the previous chapter, any sections that are not assigned to a deterioration family will automatically be assigned to a default deterioration family.



Assign Family

To assign sections to a previously created family model, open the Assign PCI Deterioration Families window. There are two ways to reach the Assign PCI Deterioration Families window. The first method is accomplished by selecting Visual Menu >> Condition Model Family Assignment >> Assign PCI Deterioration Families. The second way is to click on the Family Assignment Tool button on the tab 6. Assign Family, via the Prediction Modeling window. Once the Family Assignment Tool window is open, a drop-down list box labeled Family Model Selected appears and is where the user will select the Prediction Model to assign a family of sections to. On the window to the right, there is a button labeled Edit Family Model Definition, which reverts the user back to the Prediction Modeling window for any editing. Directly below, there is a window to manually enter a Critical condition for this Family Model, which will be set to a default PCI value of 55. This value will tell PAVER™ when to flag sections for M&R based on the family model chosen. Below the critical PCI section there are two tables side by side. The table on the right lists all the sections that are currently assigned to the chosen family model. The table on the left has several view options, but is mainly there to view what sections have not been assigned to the current family model.

Note
When selecting a model, scroll and type seek capabilities are available if the number of saved models exceeds the length of the list.

To assign sections to a family model, highlight the desired section on the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table, assigning it to the selected family model. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Similarly, the left-pointing arrows move sections to the left table from the right table. Once all desired sections have been assigned, press Close to exit the assignment tool window.

When viewing the table on the tab 6. Assign Family, in the Prediction Modeling window, the sections assigned through the Family Assignment Tool are present. On the tab, there are three buttons below the table: Assign Family to Sections, Unassign Family from Selected Section, and Family Assignment Tool. The Family Assignment Tool was described in the previous section. The other two buttons allow for the editing of the assigned family on the fly, without the assignment tool. To delete an assigned section(s) from a family model, highlight the section in the table and then click Unassign Family from Selected Section. PAVER™ will ask if you are sure that you would like to delete the desired section from the family. After clicking the OK to delete the member(s), the selected section(s) will be removed from the list. When the Assign Family to Section button is selected, the EMS™ Query tool will open, allowing the user to assign a group of sections at once. Depending on the variability of a large database, the user may want to avoid this method of assigning.

11 Condition Analysis

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- Condition Analysis Parameters 87
- Viewing The Condition Analysis Report 87

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Create Condition Analysis

The Condition Analysis feature allows the user to view the condition of their pavement network, or any subset of the network, and the analysis is based on prior inspection data, interpolated values between previous inspections, and projected conditions based on family assignment. Once the pavements to be analyzed and a duration of time have been chosen, PAVER™ can predict the deterioration of the pavements. The Condition Analysis tool is opened by choosing Visual Menu >> Condition Analysis, or through the PAVER™ Button Bar.

Condition Analysis Parameters

> *Note*
> *You can select a Start Date to show a past condition.*

When Create Condition Analysis is selected, a Condition Analysis Parameters window appears. Here the user can decide if they want to run a condition analysis on an Actual Database or a previously created Virtual Database. If an actual database is used, two options are available for selecting inventory items to be reported: All Items and Build Selection using Query Tool The default is set to All Items. Choose Build Selection using Query Tool to select a subset for the report. After selections are made, the selection criteria is shown in the previously empty white box. The Record Count box shows the number of sections included in the current plan.

At the bottom of the window the plan start date and plan length, in years, can be defined. The report includes historical information and predicted conditions for selected sections, for each annual interval over the defined plan length.

Viewing The Condition Analysis Report

Once the report has been configured, click Execute to start calculating the report. After the report calculations are completed, the EMS™ Report Viewer tool and Select GIS Views windows are presented.

EMS™ Report Viewer

> *Note*
> *Data shown in the Summary View is branch level data, while data shown in the Detail View is section level data.*

The View menu in the EMS™ Report Viewer can be used to add or remove tables and associated graphs from the report viewer screen. It can also be used to switch between the summary and detail views of the report. To turn off one of the summary tables and its associated graph, select View >> Summary, and then select the table that you want to turn off. Tables and graphs that are active in the current report have a check mark to the left of the table or graph name.

As usual, in order to zoom in on a table or graph, right-click on the desired object and select Zoom. Other options can be selected with a right-click such as: Revise Layout, Change Sort Order, Export, and Print Table.

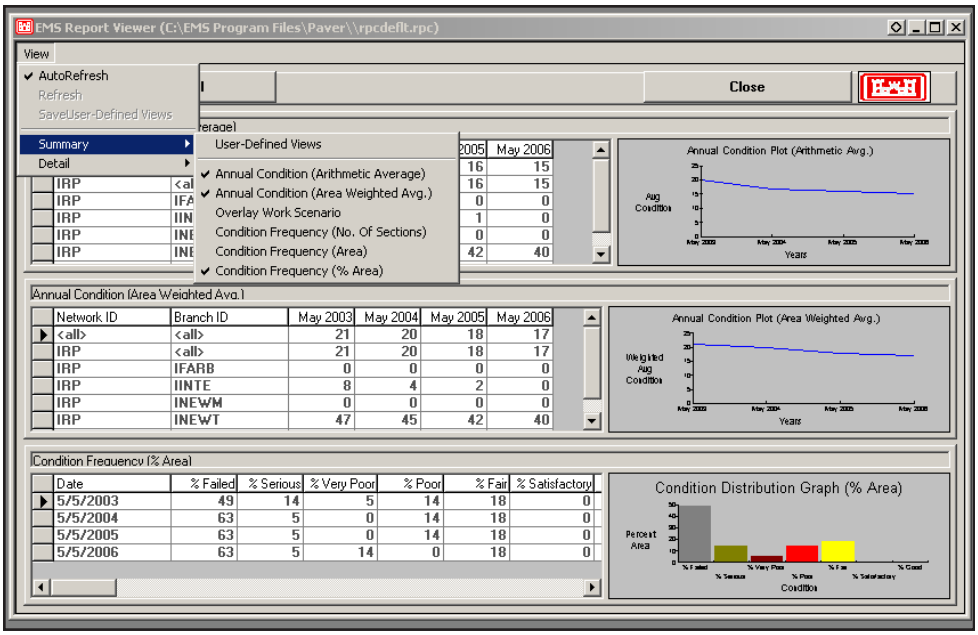
Summary Views

The Summary version includes the following available views:

- Annual Condition (Arithmetic Average): Shows the Annual Condition Arithmetic Average for each branch, for each year, in the reporting period. The first row of the table summarizes all branches included in the report. To view individual branches, click the desired Branch ID to highlight the

section. The condition summary table is accompanied by a graph that plots the average condition for the highlighted branch (row) in the condition summary table.

- Annual Condition (Area Weighted Average): Shows the Annual Condition Area Weighted Average for each branch, for each year, in the reporting period. The first row of the table summarizes all branches included in the report. To view individual branches, click the desired Branch ID to highlight the section. The condition summary table is accompanied by a graph that plots the average condition for the highlighted branch (row) in the condition summary table.
- Overlay Work Scenario: Allows the user to choose a previously made work plan, and apply it to the current condition analysis report. This allows the user to see the effect of any planned work on the database, over the length of the analysis.
- Condition Frequency (Number of Sections): This table is divided into six default, unless otherwise specified, PCI categories (excellent, very good, good, fair, poor, and failed). Under each of these categories, the number of sections are presented for each year in the reporting period. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.
- Condition Frequency (Area): This table is divided into six default, unless otherwise specified, PCI categories (excellent, very good, good, fair, poor, and failed). Under each of these categories the section area is presented for each year in the reporting period. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.
- Condition Frequency (% Area): This table is divided into six default, unless otherwise specified, PCI categories (%excellent, %very good, %good, %fair, %poor, and %failed). Under each of these categories, the percent section area relative to the total area is calculated for each year in the reporting period. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.

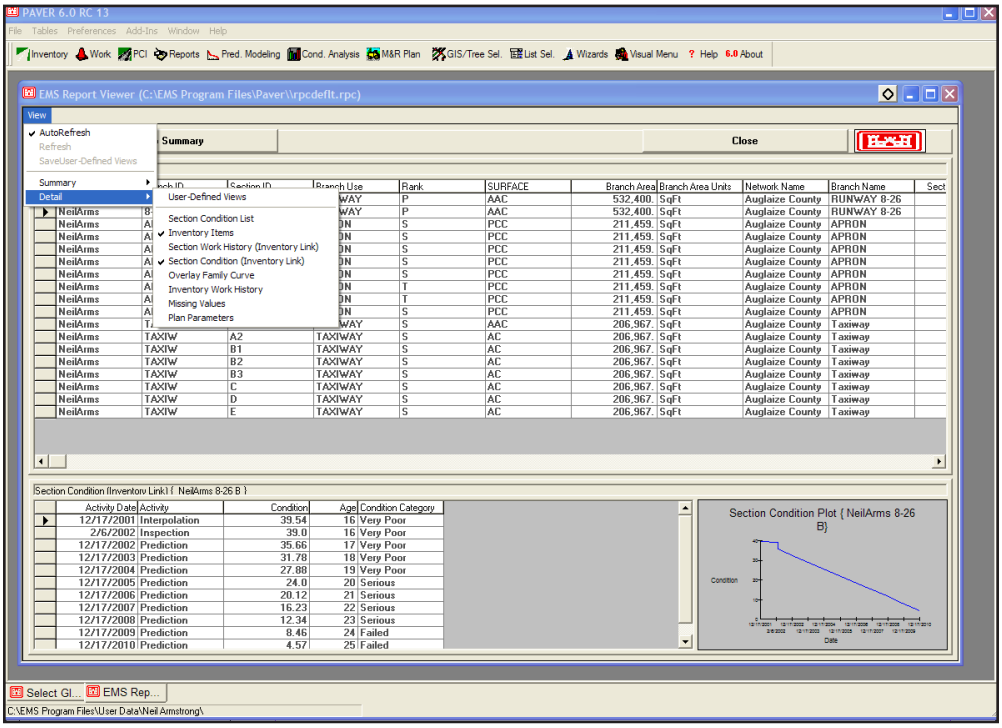


Detail Views

The Detail version includes the following available views:

- Section Condition List: A representation of the condition plot for each section over the length of the reporting period. Highlighting a record in the table causes the graph to respond, displaying the condition information for that section only. To see an average for all sections included in the report, go to the summary views.
- Inventory Items: Each row in the table represents one section in the pavement network. As the highlighted row in the Inventory Items table is changed, the Section Condition table updates with historical, interpolated historical, and projected condition values for that section. Each time the Section Condition table is updated, the graph associated with the table replots the graphical view of the section condition. This allows the user to quickly analyze the history and predicted condition of the network section by section.
- Section Work History (Inventory Link): The Section Work History view (also linked to Inventory Items) produces a list of all information in the work history table by section.
- Section Condition (Inventory Link): The Section Condition Table is linked (as the dependent table) to the Inventory Items table (parent table).
- Overlay Family Curve: Overlaying a family curve on the Section Condition plot shows how the current view is performing in comparison to a particular family model.
- Inventory Work History: The Inventory Work History view displays ALL work history records for every item in the current database.
- Missing Values: The Missing Values table displays all values that were not included in the report for the listed description in the table.

- Plan Parameters: The Plan Parameters table lists all of the parameters that were defined for the current condition analysis report



Select GIS Views

In addition to the EMS™ Report Viewer, the Condition Analysis report opens a Select GIS Views window. This window contains a preset view, Section Conditions by Year, which is linked to the results of the current Condition Analysis report. The resulting display is a year-by-year view of the conditions of each section included in the condition analysis. This GIS view quickly shows the difference in condition from year to year.

Open Saved Condition Analysis

You can view a previously saved report by clicking View Existing Report, to the left of Execute, on the Condition Analysis Parameters window. Another method of opening a report is by selecting Visual Menu >> Condition Analysis >> Open Saved Condition Analysis. Employing either method brings up a dialog box asking from where to load the report. Condition Analysis report files carry the extension *.ca.

12 M&R Family Assignment

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Assign Families 92

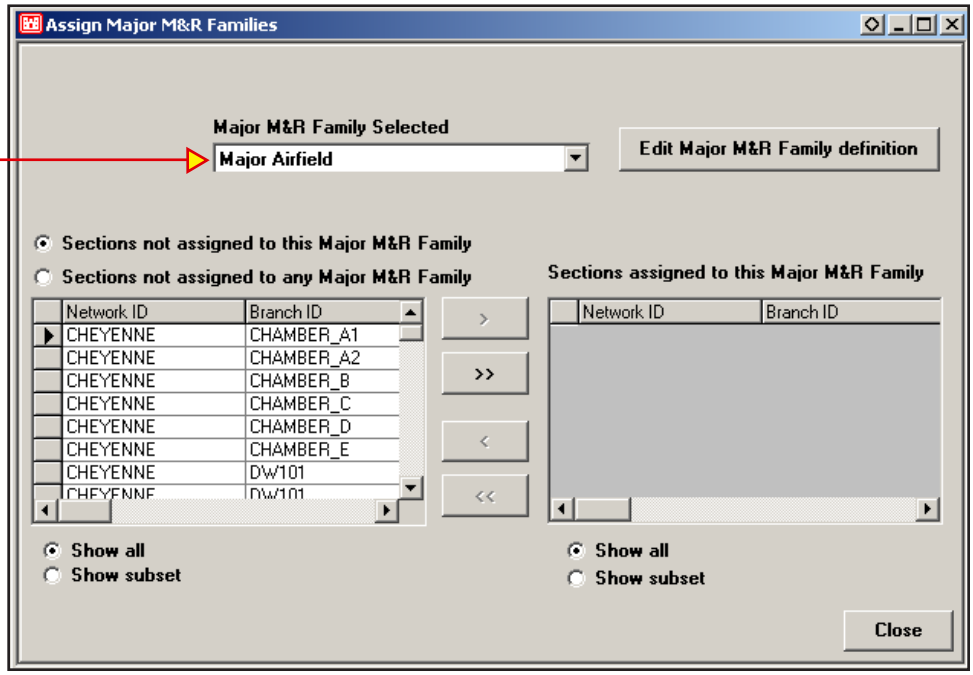
Assign M&R Families

The M&R Family Assignment Tool is used to designate sections to receive specific M&R work, including:

- Localized Stopgap
- Localized Preventative
- Global Preventative
- Major M&R.

Assigning sections to receive specific M&R work helps the user develop a work plan tailored to their specific site. Once sections have been assigned to M&R Families, the M&R Plan is executed (see Chapter 13 M&R Plan).

M&R Family Assignment selected work type



Assign Families

To assign M&R Families select Visual Menu >> M&R Family Assignment. Once this is selected the right-hand side of the Visual Menu will display the different categories of M&R work:

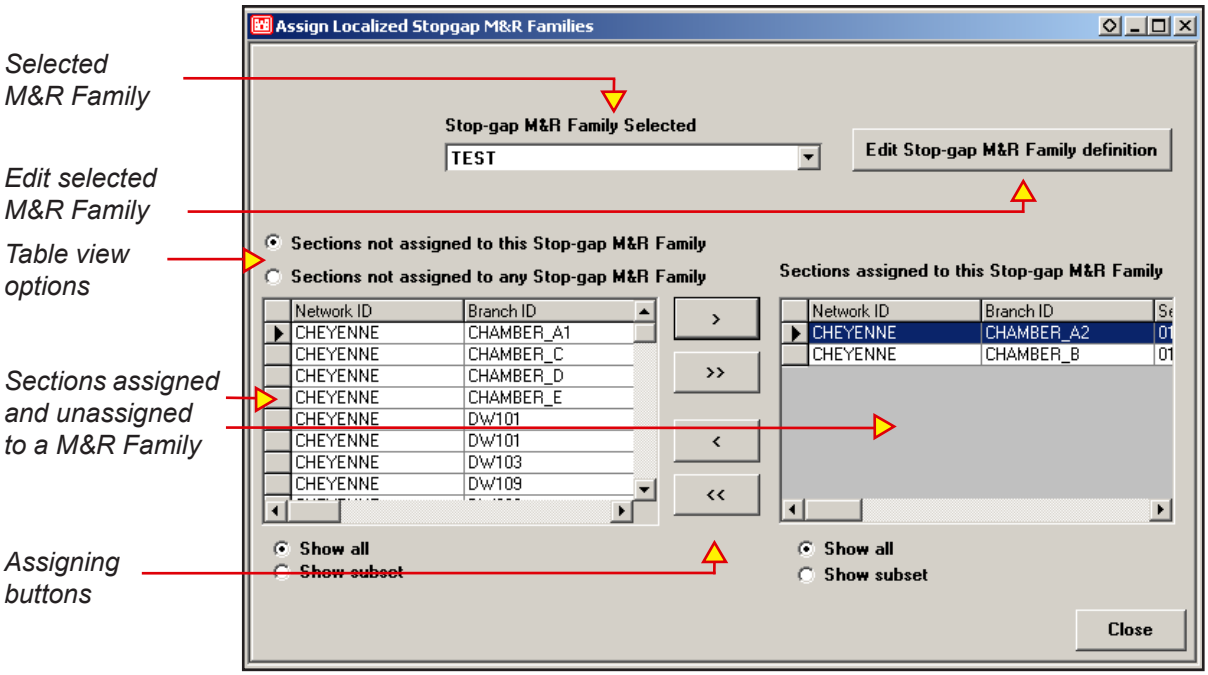
- Localized Stopgap M&R Families
- Localized Preventive M&R Families
- Global Preventive M&R Families
- Major M&R Families

Once an M&R Family Assignment work type has been chosen, the assignment window will open. The M&R Family Assignment Tool interface is very similar to the Condition Model Family Assignment Tool. On the top of the form, the user can select which M&R Family to build upon. There are two previously created default families for every work type, roadway, and runway. Sections can

be assigned to the default families, or the user can name and build a new family by clicking on Edit to the right of the selected M&R Family. The user can delete or define a new family with the Delete and Add buttons.

Below the M&R Family selection there are two tables side-by-side. The table on the left shows what sections have not been added to the current family model, and allows the user to build a subset. The table on the right lists all the sections that are currently assigned to the chosen M&R Family.

To assign sections to a M&R Family, highlight the desired section on the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table, assigning it to the selected M&R Family. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Alternately, the left-pointing arrows move sections from the right table to the left table. Once all desired sections have been assigned, press Close to exit the assignment tool window.



13 M&R Plan

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Create A M&R Plan

Overview

The PAVER™ Work Plan is a tool for planning, scheduling, budgeting, and analyzing alternative pavement maintenance and repair (M&R) activities. The M&R Plan utilizes basic inventory data combined with inspection information, maintenance policies, maintenance costs, and predictions about future pavement condition. Work Plan results are specific to the user's site, and all factors used in determining future M&R or construction activity, or the associated costs, can be configured to reflect specific pavement management practices and costs.

The Work Plan Parameters window is opened by clicking Visual Menu >> M&R Plan >> Create M&R Plan, or by clicking M&R Plan on the PAVER™ Button Bar. The Work Plan report operates like the Condition Analysis report. The Work Plan Parameters window is organized with these five tabs: Plan Setup, Budget, M&R Categories, M&R Families, and Project Planning. When the Work Plan report is configured, Execute the report and view the results in the Report Viewer.

Tab 1 - Plan Setup

Note
Selecting the Consequence Model option, on the Plan Setup tab, automatically forces the Years value on the Timing tab to "1".

The first step when developing a work plan is to establish an inventory. On the Plan Setup tab, the user can decide if they would like to run an analysis on the Actual Database that is currently open, or a preciously created Virtual Database. If the user decides to use an Actual Database, two options are available for selecting inventory items to be reported: All Items and Build Selection using Query Tool. The default is set to All, but to choose a subset of sections or records for the report , select Build Selection using Query Tool. The EMS™ Query Tool window will appear allowing the selection of a subset. If a graphical selection of subsets is wanted, select None, and then OK in the EMS™ Query Tools window. A GIS map and tree selector window will appear, allowing the user to select the desired sections to include in the report. Note that if a GIS map has not been converted into PAVER™, the GIS window will be blank (for further information regarding converting a GIS map into PAVER™, see Chapter 14 GIS Tools). After selections are made in either the Query or GIS windows, click OK to exit out of the selection process. In the M&R Plan Parameters window the selection criteria is shown. When checked, the Record Count box shows the number of sections included in the current plan.

Below the inventory selection is Select Plan Start Date and Plan Length. Enter the desired Start Date and the number of Years to run the M&R Plan. The Start Date field must be entered in mm/dd/yy format. The drop-down arrow next to the Start Date activates a calendar window for ease of viewing. The Plan Start Date cannot be set to an earlier date than the current date, and the Plan Length must be between one and twenty years.

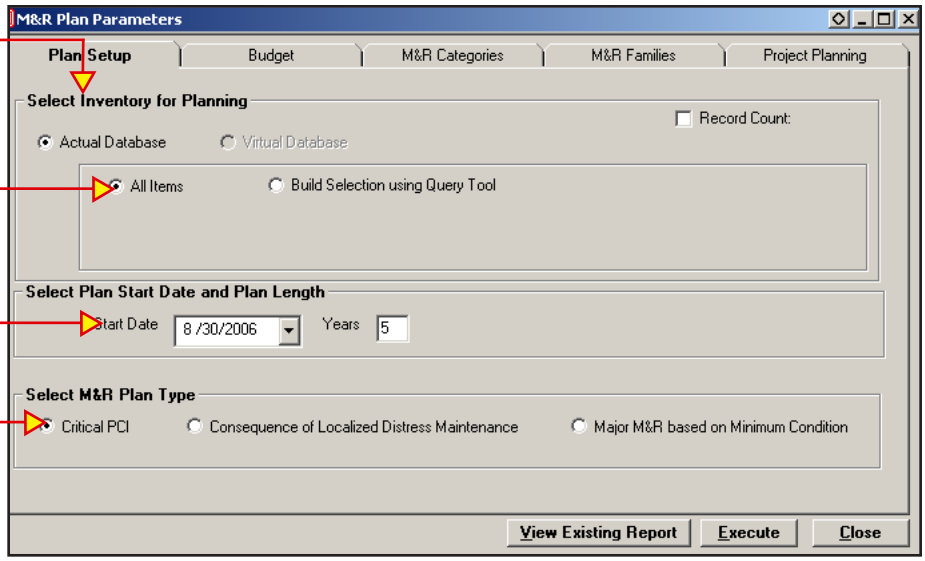
At the bottom of the Plan Setup tab there are three variations of the Work Plan. The first, Critical PCI Method, optimizes M&R activity against a specified budget, or determines the budget needed to maintain a specified condition Level. The second, Consequence of Localized Distress Maintenance, calculates the cost and resulting condition of immediate implementation of local M&R, for the year of the most recent inspection. Choosing Consequence Model automatically changes the work plan duration in the Timing tab to one year. The Third, Major M&R based on Minimum Condition, lets the user set the lowest pavement condition (PCI) that is allowed per year. To edit or add a new minimum condition table, refer to Chapter 3 System Tables >> M&R Tables and Families >> Major M&R Tables and Families.

Select an actual or virtual database

Indicate if M&R will be applied to All or Selected Items

Select Start Date and Years to run M&R Plan

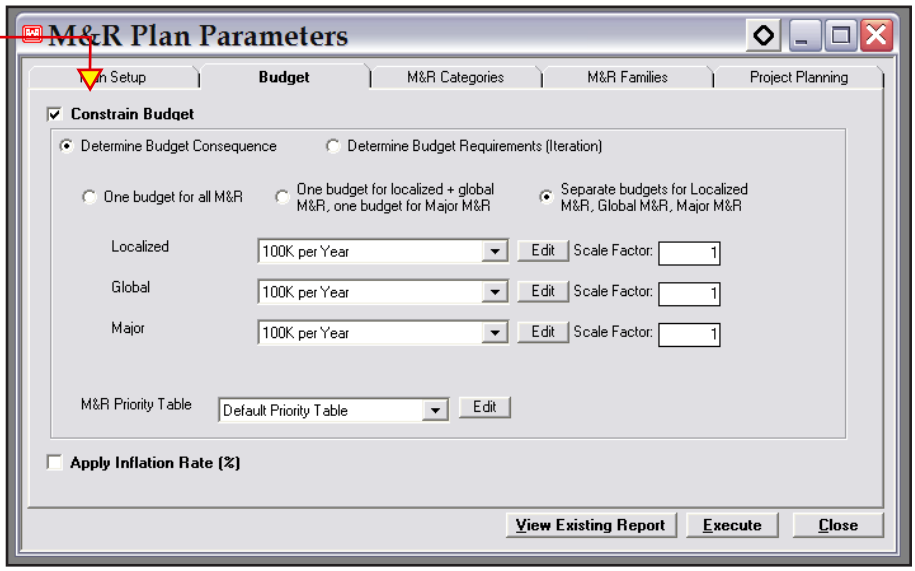
Select M&R Plan Type policies



Tab 2 - Budget

The user can choose to use three different budget split scenarios: one budget (for all M&R), two budgets (one for localized and global M&R and one for major M&R), or separate budgets (for localized, global, and major M&R). Next to each Budget there is a drop-down list box, used to select a previously created PAVER™ M&R budget table for the report. To the right of the drop-down list box is the Edit button, which is used to review and edit the selected budget table, or for creating a new table. The Scale Factor window allows the user to multiply or scale the currently selected budget.

Select if a custom budget is wanted

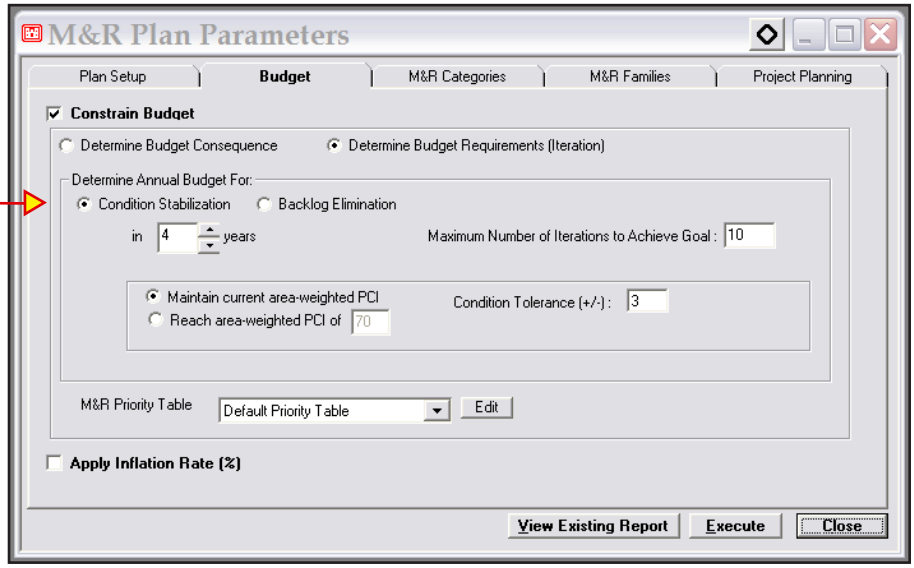


The other main option, Determine Budget Requirements (Iteration), allows the user to view what budget and M&R is necessary to achieve a user-defined goal. When selecting Determine Budget Requirements, two options/ goals appear to choose from: Condition Stabilization or Backlog Elimination in X amount of years. When Condition Stabilization is chosen, two more options appear. The user must specify either Maintain current area-weighted PCI or Reach area weighted PCI of X. Along with these two options are the following

Hint
You can create a budget of $100,000/ Year using the Budget multiplier feature in the M&R Work Plan.

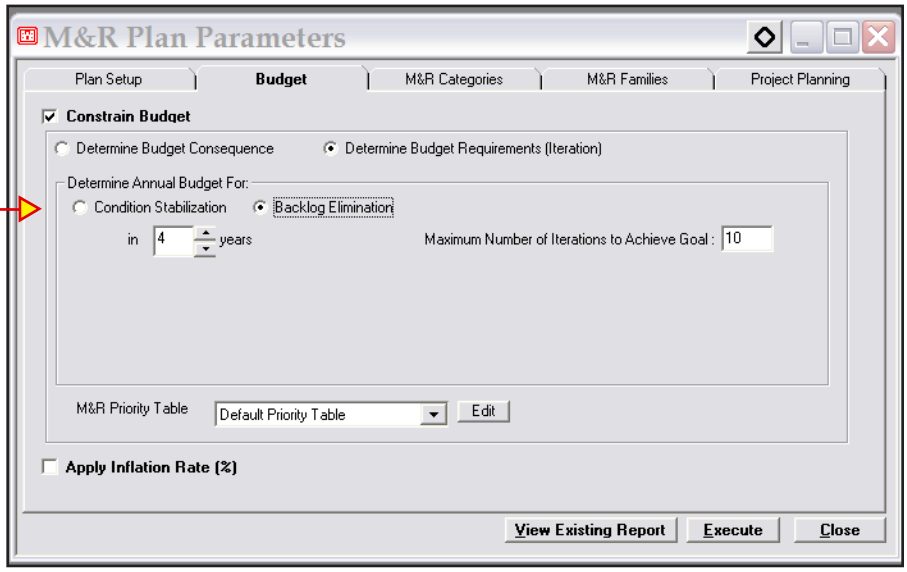
plan requirements: Condition Tolerance (+/-) and Maximum Number of Iterations to Achieve Goal. Condition tolerance allows the desired goal to vary within the set tolerance, while the number of iterations tells the program how many times to run to achieve the desired outcome.

Budget requirements and Condition Stabilization options



Selecting Backlog Elimination will report what M&R budget is required to achieve an overall section level PCI above critical within X amount of years. Once Backlog Elimination is selected, the year toggle and Maximum Number of Iteration to Achieve Goal options appear. The year toggle sets the number of years to reach backlog elimination. This value must be equal to or less than the total number of years the report was set to run on the Plan Setup tab. Like the Condition Stabilization goal, the maximum number of iterations tells the program how many times to run to achieve the desired outcome.

Budget requirements and Backlog Elimination options



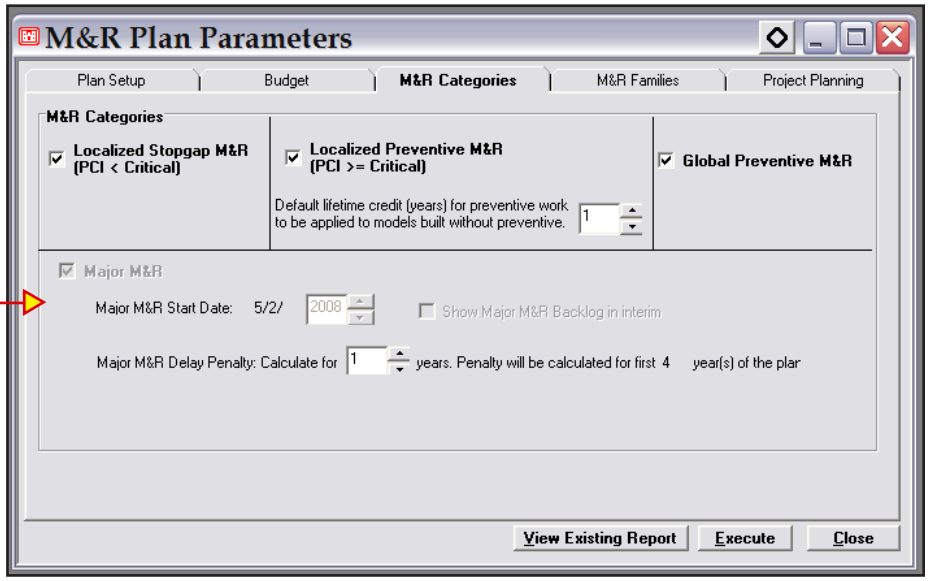
Below the main Use Budget checkbox, is the checkbox to apply an Inflation Rate. Once this is checked, the program will run the report with the defined inflation rate. The default inflation rate is set to 3%.

Tab 3 - M&R Categories

> *Note*
> *The user may create multiple M&R Cost by Condition tables.*

The M&R Categories tab is where the user selects which policies to use in the work plan. The Localized Stopgap (PCI < Critical) option is used to indicate the use of Safety M&R policies, which allows PAVER™ to plan localized stopgap M&R work (pothole filling, etc.) on areas where the PCI is below the critical level. The Localized Preventative M&R (PCI >= Critical) checkbox allows PAVER™ to plan M&R work in localized areas where the PCI is above critical. Just below the local preventative checkbox is a white box with a toggle switch. Here, life extending credit, in years, can be given to any localized preventative work. Applying any preventative work where the PCI is still above critical will save money and add years to the pavements life. The Global Preventative M&R checkbox allows PAVER™ to plan M&R work on a global level. This M&R includes any slurry seal or other global preventative work where the pavements life is increased. The Major M&R checkbox allows PAVER™ to plan major M&R work. Work in this area includes any overlay or other major work where the resulting pavement has a PCI of 100. Below the Major M&R checkbox is an option to specify the Start Date of the Major work, a value within the specified plan length set on the Plan Setup tab. Below and beside the Start Date are the checkboxes: Calculate Major M&R delay penalty and Show Major M&R Backlog in interim. Calculate Major M&R delay penalty reports any delay costs associated with delaying the start date of Major M&R over the length of the work plan. Show Major M&R Backlog in interim displays any remaining backlog between the years of calculation.

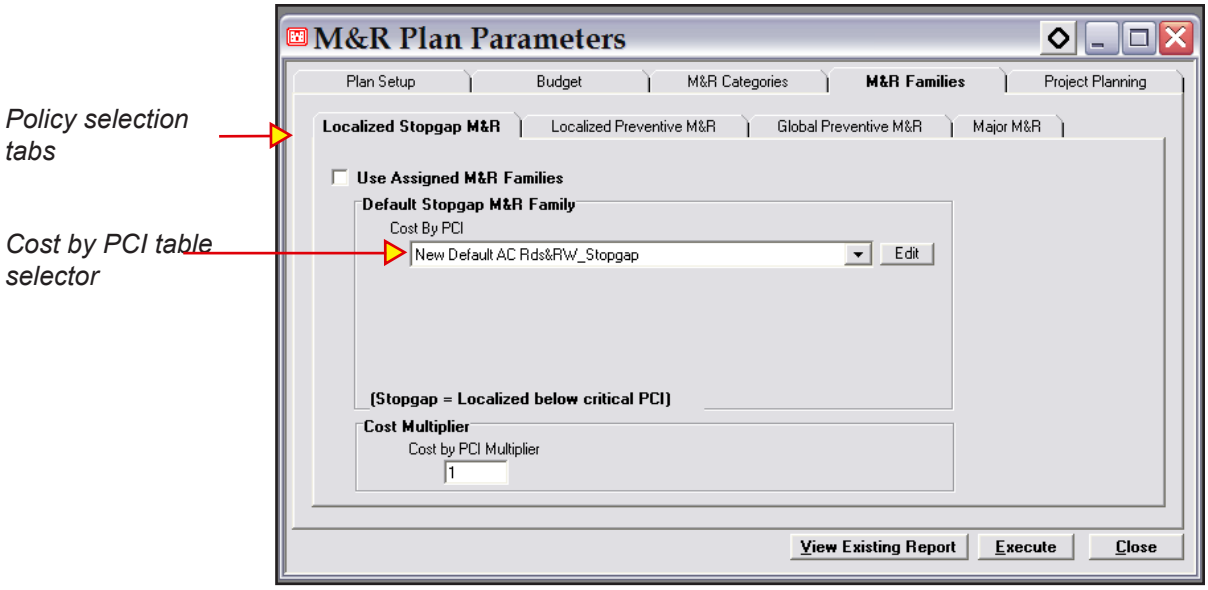
Select which M&R policies to apply to the M&R Plan



Tab 4 - M&R Families

On this tab, M&R Families are assigned to four specific M&R policies, arranged in tabular form: Localized Stopgap M&R, Localized Preventative M&R, Global Preventative M&R, and Major M&R. On each of the four policy tabs there is a checkbox to Use Assigned M&R Families. If the checkbox is selected for any of the policies, the box below will prompt the user for information regarding unassigned sections. On the Localized Stopgap M&R, Localized Preventative M&R, and Major M&R tabs, the individual Cost By PCI tables can be chosen by the drop-down arrow, or viewed by the Edit button. On the Global Preventative M&R tab, the cost table can also be chosen or Edited, and the specific Global Work Type defined. For further information about editing any of the policy Cost By PCI tables please refer to Chapter 3 System Tables. Like the Budget tab, there is also a Multiply Cost

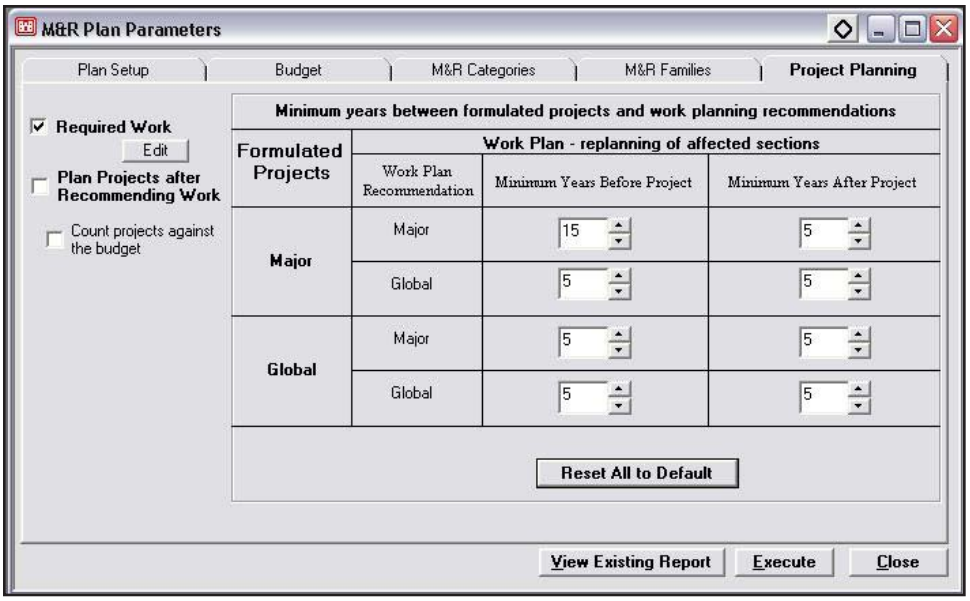
window that can be used scale the already existing cost table which is being used. If none of the boxes are checked, or no M&R Families have been created, PAVER™ will assign all sections to the default family for that policy. Please refer to Chapter 12 M&R Family Assignment, for more information on assigning sections to M&R Families.



Tab 5 - Project Planning

On the left-side of the Project Planning tab, there are two main options: Required Work and Plan Projects after Recommending Work. If Required Work is selected, PAVER™ will include in its M&R analysis, any previously designated required projects. The edit button below the selected Required Work option, is used to create and edit projects. If Plan Projects after Recommending Work is selected, PAVER™ will allow the user to plan M&R after the plan is Executed, through a Project Planner window. This window will open automatically, along with the Executed M&R Plan results, and allows the user to apply any created projects to the executed plan directly. If either Required Work and/ or Plan Projects after Recommending Work is selected, a work interval section is shown on the right-hand side of the tab. This section sets a minimum and maximum time interval for which PAVER™ is allowed to recommend work in the work plan, on any required projects. The time interval can be set for both Required Major and Required Global work types, and their appropriate global and major work intervals.

To view existing projects or plan required projects, click Edit below the Required Work checkbox. When this is clicked, a new Project Planner window will appear, and in the upper-left corner, a Current Project box. Here, previously created projects can be selected by the drop-down arrow, or new projects can be created by selecting New. Projects can be copied, renamed, or deleted by clicking on the appropriate buttons. Any competed projects can be moved to PAVER™'s work history by using the Project Completed - Move to work History button on the top-right corner of the window.



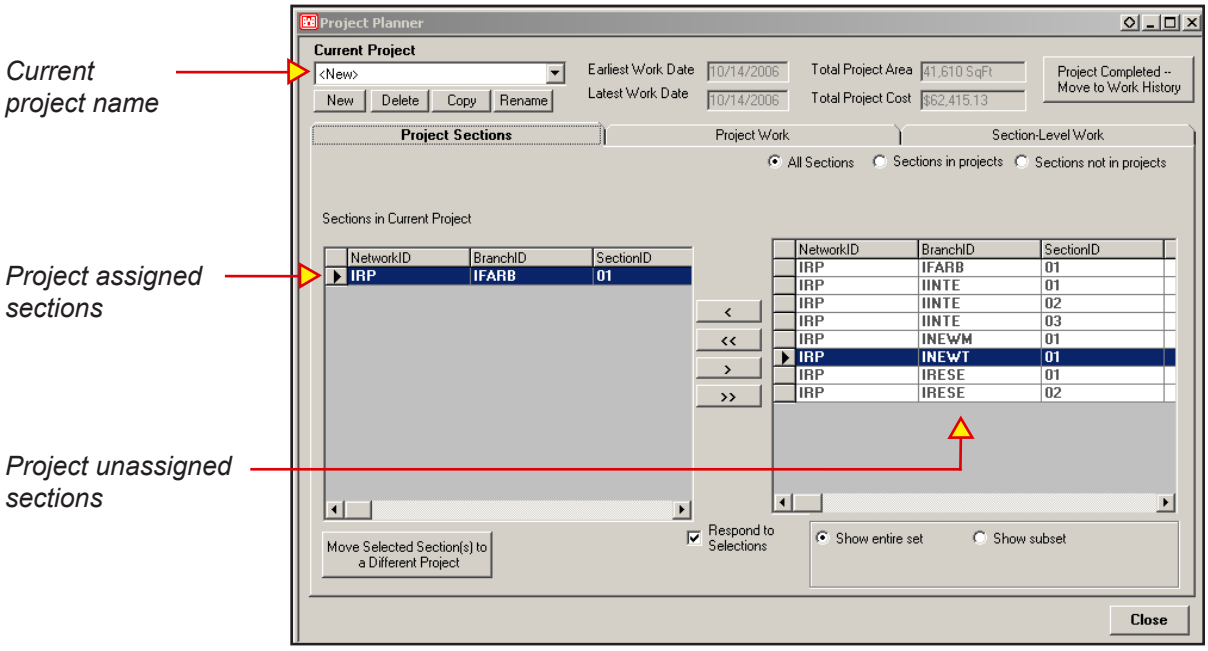
To create a new project, first name the project, then begin assigning sections and their associated work to the project. On the Project Planner window, there are three tabs: Project Sections, Project Work, and Section-Level Work. On the Project Sections tab sections are assigned to the project. The table on the right lists all the sections that are currently assigned to the chosen project, while the table on the left is mainly there to view the sections that have not been assigned to the current project. To assign a section to a project, highlight the desired section in the left-hand table and click the single, right-pointing arrow dividing the two tables. This will move the highlighted section to the right table and assign it to the selected project. If the double, right-pointing arrow is selected, it will assign and move all sections from the left table to the right table. Similarly, the left-pointing arrows move sections to the left table from the right table. Moving sections to another project can be done by highlighting them and clicking Move Selected Section(s) to Different Project, located at the bottom of the window. This button also gives the user the option to copy the associated work with the section(s).

Once sections have been assigned to a project, the user can begin to assign work, using the three remaining tabs: Project Work, Section-Level Work, and Work Item Views. The Project Work tab is used to assign work items that are to be applied to all of the sections in a project, the Section-Level Work tab is used to assign work to individual sections in a project, and the Work Item Views tab is a summary of the assigned projects.

Note
*Work quantities should be entered as positive values, **except** for cold milling, which is a negative value.*

On the Project Work tab, any previously assigned project level work will be listed in the table area. To the left of the table there are three buttons to modify project work items: Add, Edit, and Delete. To add project work, select Add, and a new window appears called Add Work Item - Project Level. Here, the Phase of the project, Work Category, Work Date, Work Type, Material Type, and Thickness are entered. Costs can be entered in two different ways for project work. The first method is to base the work cost on an area unit cost, by selecting the Calculate Unit Cost option and then a default or customized Cost Table via the drop-down arrow. Once the Cost Table is selected, click Unit Cost from Table and PAVER™ will calculate the Total Cost. The second method to enter a work cost is to simply enter the pre-determined Total Cost, by selecting the Total Cost option and then entering the Total Cost in the space provided. After any Comments have been entered at the bottom of the window, select OK to exit out of the window,

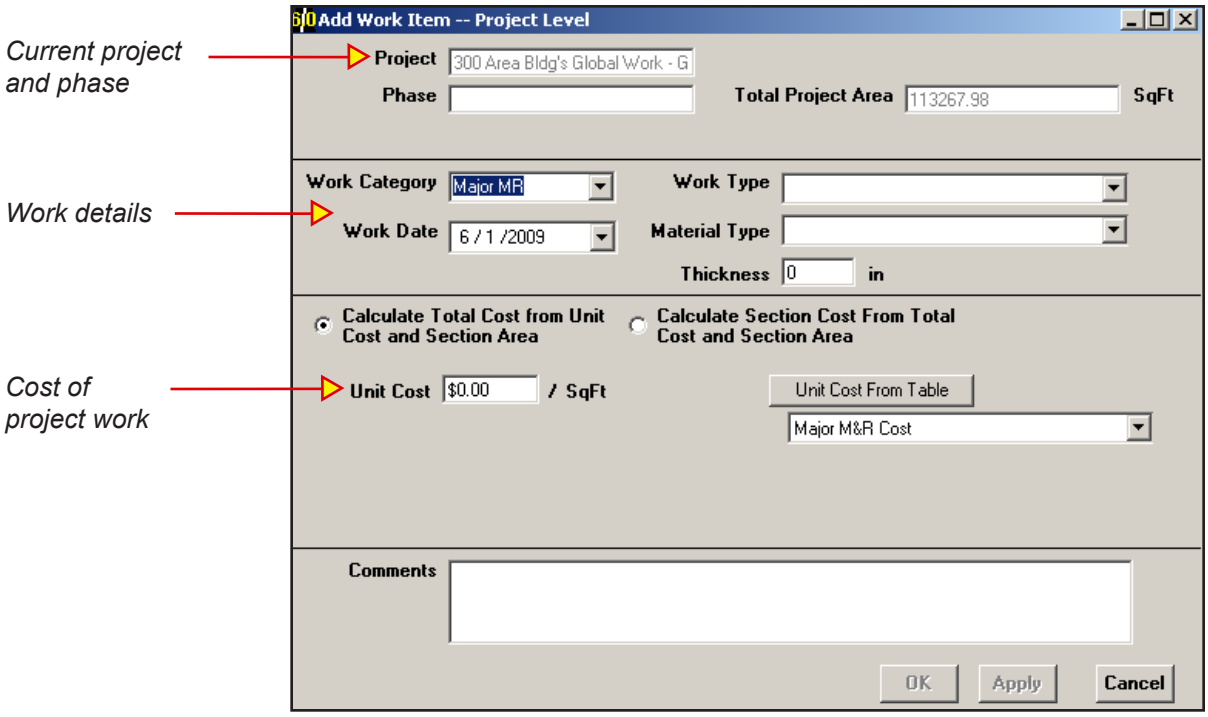
or select Apply to add another work item. Once back on the Project Work tab, all of the project level work will be listed in the table for easy review.



The Section-Level Work tab operates like the Project Work tab. On the left-side of the tab there is a table listing all of the sections in the current project. When a section is highlighted in the left table, the right table will display what work items are associated with that section. Any project work that has been assigned on the previous tab will appear for every section. The buttons on the far right of the tab are used to modify the individual work items. To edit or delete any of the items, highlight the desired work item in the table, and this will activate the edit and delete buttons. If any new items are added or old items are edited, the user form operates and looks like the Add Work Item - Project Level. Project level work must be edited on its own tab and cannot be edited on the Section-Level Work tab.

Work Items View tab gives a summary view of the work items, or you can select to view the details of each work item.

Once all of the desired work has been planned, close out of the Project Planner to return to the main M&R Plan Parameters window. Once the Work Plan has been fully configured, clicking Execute on the bottom of the M&R Plan form launches the process. The plan analysis may take some time, depending on the plan configuration as well as the database size.



Analyzing M&R Activity

When the report calculations are completed, the Work Plan report is presented in the Report Viewer tool. The views on the Report Viewer tool can be changed between a Summary and a Detailed view, each with their own table/ graphical views. The default presentation of the report is a basic overall summary of the Work Plan.

Summary View Section

The View menu, within the PAVER™ Menu, is used to add or remove tables and their associated graphs from the report viewer screen, or to switch between the Summary and the Detail version of the report. To turn off one of the Summary tables and their associated graphs, select View >> Summary from the PAVER™ Menu, and then select the table that you want to turn off. Tables or graphs which are active in the current report view, have a checkmark to the left of the table or graph's name. Some of the views might not be applicable to the type of report run.

Note
Data shown in the Summary View is branch level data, while data shown in the Detail View is section level data.

Summary views include:

- User-defined Views: Displays any previously created Customized views. Customized views can also be created by choosing this option.
- Condition Frequency before Repair: This table is divided into six default, unless otherwise specified, PCI categories (excellent, very good, good, fair, poor, and failed). Under each of these categories, the number of sections are presented for each year in the reporting period before repair. As in the other tables, highlighting an individual year will display its associated graph to the right of the table.

- Annual Condition After Repair: Displays the condition of each branch and the entire network(s) after the recommended work has been performed.
- Condition Table: Shows a “before and after” average condition of all sections included in the current plan and for each year of the plan.
- Total Funded/ Total Unfunded: These tables show how much money was spent (Funded) and how much PAVER™ wanted to spend but did not have the funds (Unfunded or Backlog).
- Expenditure Summary: Lists the category and amount spent per year.
- Project Summary: Lists all of the projects and project details that were included in the M&R Plan report.
- Project Contents (link Project Summary): This table is linked with the Project Summary table, and lists the sections and section details of the project that is highlighted on the Project Summary table (which is included in the M&R Plan report).

Detail View Section

The Detail (View >> Detail) version of the Work Plan includes User-defined Views table, Section M&R and Resulting PCI by Year table, Global M&R by Section table, Major M&R by Section table, Inventory Items table, Funding Detail Table, Missing Values Table, and Plan Parameters table.

Table definitions include the following:

- User-defined Views: Displays any previously created Customized views. Customized views can also be created by choosing this option.
- Section M&R and Resulting PCI by Year: Displays a detailed section list of the M&R that PAVER™ recommends be completed on a yearly basis.
- Global and Major M&R by Section: These tables further break down the PAVER™ recommended M&R, by separating the Global and Major M&R by section. The separated Global and Major M&R tables are also accompanied by specific M&R section details.
- Inventory Items: Displays all inventory items included in the report by section, and lists section details.
- Funding Detail Table (Link Inventory): This table is linked to the Inventory table, and displays the funding categories of the highlighted section on the inventory table.
- Funding Detail Table (all section): Shows a detailed breakdown of the funding categories, for all sections included in the M&R Plan report.
- Missing Values: Displays all values that were not included in the report, for the listed description in the table.
- Plan Parameters: Shows the parameters that were defined for the current condition analysis report

As with the Condition Analysis Report, the M&R Report also produces a Select GIS Views window that allows the user to see GIS views associated with the current M&R Report. The preset views are:

- After Conditions by Year: Shows the condition of each section in the report "after" the funding (work) has been applied to that section.
- Major and Global M&R All Years: Shows the PAVER™ recommended Global and Major M&R over the entire length of the M&R Plan report.
- All M&R by Year: Shows the PAVER™ recommended M&R, both Global and Major, for each year of the M&R Plan report.
- Project Assignment: Displays the planned projects (sections included) that were created before running the report.
- Major M&R by year: Displays only on Major M&R work per year, and is split into two categories: Above Critical (for sections above the critical PCI) and Below Critical (for sections below critical).
- Global M&R by year: Displays only on Global M&R work per year.
- Localized M&R by year: Displays only on Local M&R work per year.

Reminder: GIS views are only available if a coverage or shapefile is linked to a database (See Chapter 14 GIS Tools).

Open A Saved M&R Plan

As with the Condition Analysis reports, a user can save any M&R Plan that is ran, saving the time it takes to execute the report. Depending on the speed of the computer, the parameters of the report, and the size of the database, this could be a significant advantage. Saving a M&R Plan also provides an easy and efficient method to compare different reports.

Required Work Planner

When Required Work Planner is selected via the Visual Menu, the Project Planner window appears. This is the same project planner window that is described above under tab 5 Project Planning, operating in the same way but allowing the user to bypass the main M&R Plan Parameters tool.

14 GIS Tools

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Shapefile Creation/ Modification

Shapefile Creation

In PAVER™ 6.5, GIS tools are substantially upgraded from previous versions of the software. GIS capabilities are now integrated with the software and are easier to operate and employ. Shapefiles can now be imported and exported with *.e60 and *.e65 files. First though, you must have a shapefile consisting of polygons which represent your database's section definitions. If you don't already have a shapefile representing your database, there are three main options for obtaining/ creating a shapefile:

Note
For GIS tools to work in PAVER™, polygons can only have x and y plane values (no z-axis values).

1. Obtain a shapefile from your GIS personnel, and modify it to represent your section definitions.
2. Import AutoCAD drawings of your pavements to a GIS program such as ArcGIS. The AutoCAD to GIS data conversion process can be difficult, though there are many aftermarket programs to ease this migration. Still, the conversion is time-consuming and often results in data quality issues which must be fixed in a GIS program. Some of the data quality issues are:
   - Due to errors in the AutoCAD drawing (such as gaps), it is difficult to get a one-to-one feature match for every object, resulting in information loss. For example, it is unlikely that each line in AutoCAD representing a road will be accurately translated to polygons in your shapefile.
   - Most AutoCAD maps were not designed for GIS analysis but instead were created to serve as hardcopy drawings. Therefore, they may not be accurate in their scaling, measurements, or projection/ coordinate system. If an accurate representation of measurement and georeferencing is required, your newly translated shapefile will require manipulation.
   - Typical AutoCAD maps display differing attributes in multiple layers. In contrast, a shapefile contains an attribute table which can contain information for many variables. After the AutoCAD drawing is translated to a shapefile, attributes will probably have to be added or imported, as each translation will only result in one attribute being carried over to a single shapefile.
3. Digitize your section definition polygons from an image, and then scale and/ or georeference your new shapefile as necessary.

Accurate shapefile creation is undoubtedly easier with the help of a person who is proficient in GIS. This is especially true if accurate georeferencing is required and/ or desired.

Shapefile Modification

Section definitions often need to be changed. This may mean simple name changes in your PAVER™ database or deleting, adding, or changing the shape of the section polygons. There are two pathways to update your sectioning. The difference between the two methods is in how the polygons are associated with your PAVER™ database.

In PAVER™, each pavement section is assigned a unique ID - a random string consisting of 20 characters, numbers, and/ or symbols. When a polygon is linked to its PAVER™ data, it too is

assigned the same unique ID as the corresponding data. The use of the unique ID allows the integrity of the link between the GIS and PAVER™ data to remain, even if the network, branch, and/ or section name changes.

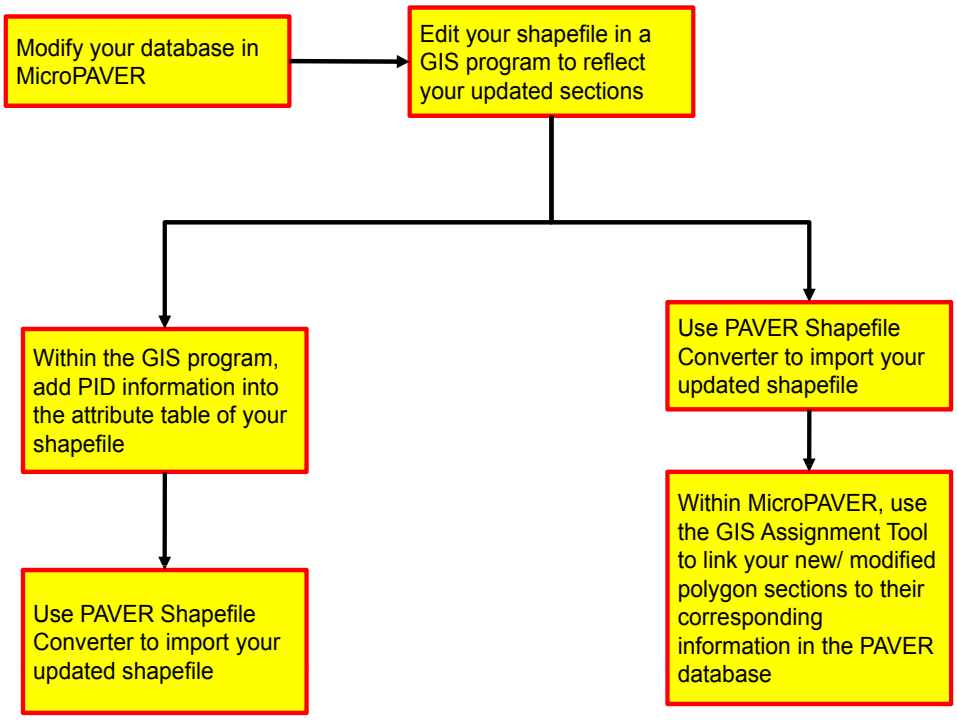
In both of the following shapefile updating methods, your shapefile is modified using a GIS program, and your database is updated using PAVER™. Then in order to link the data and the shapefile you can either:

1. Import your new shapefile into PAVER™ using the Shapefile Converter, and then manually link data with a polygon using the GIS Assignment Tool- a "point-and-click" user interface.

2. Within a GIS program such as ArcView, add (or update if they already exist) network ID, branch ID, and section ID text fields to your shapefile's attribute table, and populate them with your updated database information. Then create another text field named PID, which is the concatenation of your network ID, branch ID, and section ID, with commas separating the three fields, but no spaces. This is essential in order for PAVER™ to correctly link your shapefile and database together.
   As an example, suppose you had a network ID of Stevensen, branch ID of Scott, and section ID of 02. Your PID field for this polygon should read: Stevensen,Scott,02.

   To specifically calculate the PID using ArcView's Field Calculator right-click on the PID field within your attribute table and select Field Calculator. Then in the PID = box type: [NETWORK_ID] & "," & [BRANCH_ID] & "," & [SECTION_ID], and click OK.

The following diagram shows the overall workflow for modifying your shapefile and allowing that to reflect in your PAVER™ database.


Modify your database in MicroPAVER
Edit your shapefile in a GIS program to reflect your updated sections
Within the GIS program, add PID information into the attribute table of your shapefile
Use PAVER Shapefile Converter to import your updated shapefile
Use PAVER Shapefile Converter to import your updated shapefile
Within MicroPAVER, use the GIS Assignment Tool to link your new/ modified polygon sections to their corresponding information in the PAVER database

Shapefile Deletion

Consider the following scenario: You work for a local municipality and are getting ready to preform an updated PAVER™ roads implementation. You review your current shapefile that is linked in PAVER™ and conclude with your GIS personnel that is doesn't accurately reflect the current state of your city. You decide to obtain an updated, current, and accurate shapefile from your GIS department, and section it according to your needs. After the sectioning, you create your network, branch, and section ID fields, along with the PID field, and populate all four.

Before you can import your new shapefile you must remove the old shapefile that is within your project folder (which is found in C:\EMS Program Files\User Data\Project Folder). To do this you can literally just go into your project folder and delete the files associated with your shapefile. This task is much easier to do in a program such as ArcCatalog, which views shapefiles as a single file, though in reality they consist of several file types.

After you delete your old shapefile, run the PAVER™ Shapefile Converter to import your new shapefile to your PAVER™ database.

To avoid having to resection your entire pavement network, you alternatively could update the current shapefile found in your Project Folder (by moving it to another location on your computer, modifying it, and using the MicroPAVER Shapefile Converter to import it).

PAVER™ Shapefile Converter

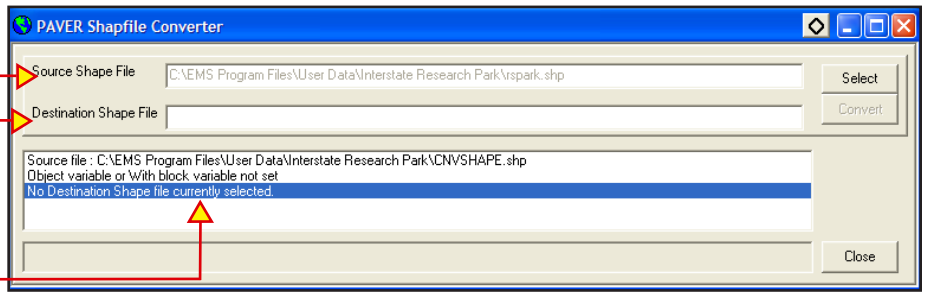
The PAVER™ Shapefile Converter is used to import a shapefile into a PAVER™ database. The shapefile conversion procedure verifies that the shapefile contains a Unique ID and/ or PID field (which PAVER™ uses to link and uniquely identify a polygon section with its corresponding PAVER™ data), and if necessary adds the field(s).

To use the PAVER™ Shapefile Converter, first open your relevant database in PAVER™. Then open the Visual Menu >> GIS Tools >> PAVER Shapefile Converter. In this window your source shapefile is defined as the shapefile that you have actively been modifying or working with. The destination shapefile is essentially a copy of the source shapefile that after the conversion procedure will be utilized by PAVER™. The source shapefile will be stored on your computer within the following directory: C:\EMS Program Files\User Data\Project Folder. Your Project Folder is simply the name of whatever you named your project. As an example, if working on a database for the town of Fort Collins, the Project Folder might be named FCollins. Once the shapefile is converted, the process is completed.

Select the source shapefile

Destination of the converted shapefile

Results of the shapefile conversion


PAVER Shapfile Converter
Source Shape File
C:\EMS Program Files\User Data\Interstate Research Park\rspark.shp
Select
Destination Shape File
Convert
Source file : C:\EMS Program Files\User Data\Interstate Research Park\CNVSHAPE.shp
Object variable or With block variable not set
No Destination Shape file currently selected.
Close

GIS Assignment Tool

What Is The GIS Assignment Tool?

The GIS Assignment tool links the PAVER™ data for individual pavement sections to GIS data, providing a 'point-and-click' interface to create, remove, or change the link between pavement sections and map features. Using the same visual layout as the Selectors, the tool reduces the time required to create or change the link between GIS and pavement data.

Note
The GIS Assignment Tool introduced in Version 5.1 replaces the PAVER™ GIS add-in.

Using The GIS Assignment Selection Tool

- To practice using the GIS Assignment Tool, open the Interstate Research Park.pvr sample database that should have been installed in the User Data folder with your installation of PAVER™ 6 (located in C:\EMS Program Files\User Data). If a new database is not opened, PAVER™ will access the database used most recently by the machine.
- Open Visual Menu >> GIS Tools >> GIS Assignment Tool.
- If the GIS data is correctly associated with the PAVER™ database, the GIS Assignment Tool dialog box that opens will contain the PAVER™ tree menu, as well as a graphical representation of the base- the GIS map (for instructions on how to associate or import a shapefile to a particular PAVER™ database, see Chapter 14 GIS Tools >> PAVER™ Shapefile Converter). The PAVER™ Tree Menu is a tree listing of the networks, branches, and sections that are entered in the active PAVER™ database. Each pavement section has a unique identification associated with it in PAVER™, used to link the GIS features to the pavement sections. The link is automatically maintained, even if the network, branch, or section identifications change.
- The colors in both the PAVER™ Tree Menu and the GIS map have different meanings: Green sections are assigned, yellow are unassigned, and red are the active and assigned sections.

GIS Assignment Tool Button Functions

- The Select tool located at the top of the GIS Assignment Tool dialog box, allows the user to associate the PAVER™ data with the GIS map.

  The GIS map of the base assigns different colors to sections with different linkage distinctions. Specifically, areas represented in green are assigned to a pavement section in the database, areas in yellow are unassigned, and sections in red identify those sections that are selected and assigned. The current sections will normally be highlighted in the PAVER™ tree menu. The Select tool will continue to be active, and may be used again, until another tool is selected.

  Note
  The GIS Assignment Tool has the same buttons found on the GIS and Tree/GIS selectors.

  1. <u>To determine the PAVER™ section identification of a section on the GIS map:</u>

To use the Select tool, click Select and the mouse icon will change to an arrow and a question mark. Click on a green section and that green section will become current, changing the color to red. The corresponding section identification will be automatically highlighted in the tree menu to the left.

2. To determine the location on the GIS map of a PAVER™ section:

   At any time, whether the Select tool is active or not, click on a section identification in the PAVER™ tree menu and the corresponding area(s) will be highlighted in red on the GIS map. This section and all these areas associated with this particular section identification will become active.

3. To newly assign a PAVER™ section identification to a section on the GIS map:

   Verify that the Select tool is active. If it is not, click Select, then click on the area on the map that you want to assign a PAVER™ section identification to. This section will be red. Next, click on the section identification (in the tree menu) to be associated with the section.

   You can also do the above task in reverse order, that is to first select the section identification in the tree menu and then select the area on the map. Either method will accomplish the same thing.

   It is possible to include more than one area in one section identification. Add an additional area to a section by highlighting the particular section identification in the PAVER™ tree menu and clicking on another area. The additional area will be added to the section, and any previous areas associated with the section identification will remain associated.

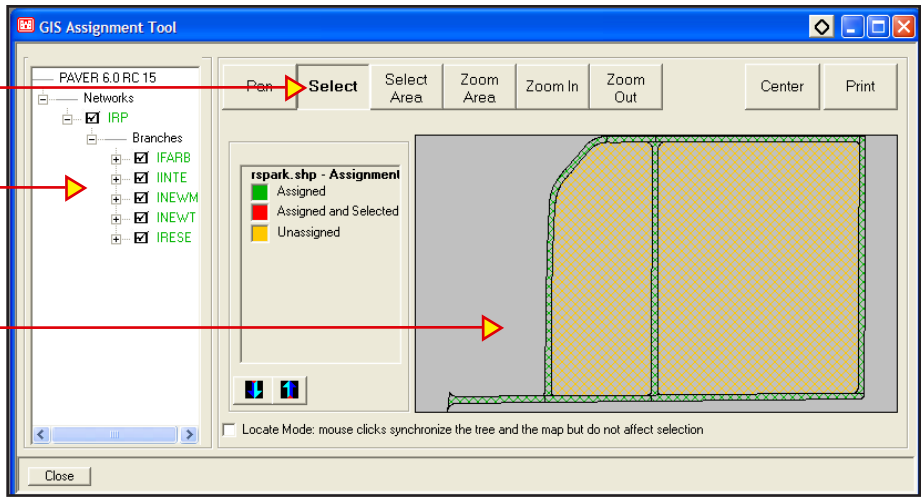
4. To change the current PAVER™ section identification assignment of a section on the GIS map:

   Click on an area that was green and is now red, and that area will turn yellow, no longer being associated with any pavement sections. Click on a yellow area, and that area will become red, indicating that it is now an area associated with the current section. The current section(s), or any section represented in red, will always be assigned to a section, therefore when another section becomes current, the original red section will change to green and will be associated with the section that was highlighted last in the PAVER™ tree menu. Click on a new section in the PAVER™ tree menu, to change the section identification assignment of the current, or red section.

The Select tool is used to assign or unassign sections

The tree is used with the Select tool to assign sections

Green sections are assigned; Red sections are active; Yellow sections are unassigned



To customize the view of the GIS map:

1. The Center tool will zoom to the original view of the entire GIS map, and will center the map on the screen. To use the Center tool, click Center.

2. The Pan tool allows the user to move the view of the GIS map, while maintaining the current zoom factor. To use the Pan tool, click Pan, and the mouse icon will become a double-arrow. Find the spot on the map you would like to move to, and place the double-arrow over it. Click and hold down the left-button on your mouse, and move the double-arrow to a new location and release. The view window of the GIS map will move so that the point first selected is moved to the point of release. The Pan tool will continue to be selected, and may be used again, until another tool is selected.

3. The Select Area tool allows you to determine the PAVER™ section identification of a section on the GIS map without changing the assignment of the active area, the current section, or the association of an area to a section identification. To operate the Select Area tool, click Select Area, and then click on any section of any color, and the corresponding section will be highlighted in the PAVER™ tree menu. The Select Area tool will continue to be active, and may be used again, until another tool is selected.

4. The Zoom Area tool allows the zoom factor of the GIS map to be changed, and allows the user to zoom in on a specific area quickly. To use the Zoom Area tool, click Zoom Area, and the mouse icon will become a cross. Position the intersection of the cross at one corner of the desired window, click and hold the left-button on the mouse and drag it to the opposite corner of the desired window, creating a box outline. If you begin the zoom window at the upper-left corner, you will drag to the bottom-right, and vice versa. If you begin the zoom window at the upper-right corner, you will drag to the bottom-left, and vice versa. Release the right-button on the mouse and the GIS map will automatically zoom to the largest view that includes everything in your zoom window. The zoom area tool will continue to be active, and may be used again, until another tool is selected. To decrease the zoom factor, use the Center tool, and start over, or use the Zoom In tool.

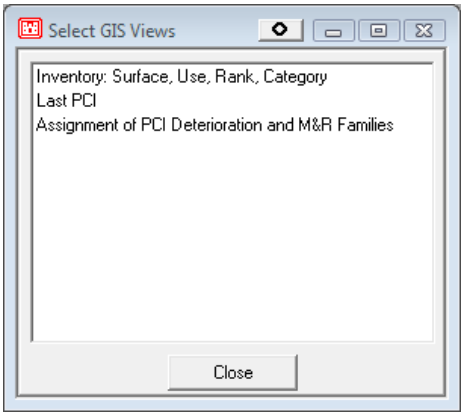
5. The Zoom In tool allows you to zoom in on a specific location. To use the Zoom In tool, click Zoom In, and the mouse icon will become an arrow. Position the tip of the arrow over the point you want to zoom in on, and click the left-button on the mouse. The GIS map view will decrease, as the scale of the map increases at scale factor of 2:1. The new view window will be centered on the tip of the arrow. The Zoom In tool will continue to be active, and may be used again, until another tool is selected.

6. The Zoom Out tool allows you to zoom out from a specific location. To use the Zoom Out tool, click Zoom Out, and the mouse icon will become an arrow. Position the tip of the arrow over the point you want to zoom out from, and click the left-button on the mouse. The GIS map view will increase, as the scale of the map decreases at scale factor of 2:1. The new view window will be centered on the tip of the arrow. The Zoom Out tool will continue to be active, and may be used again, until another tool is selected.

7. The Print tool allows the user to print a hard copy of the GIS map. To use the Print tool, click Print. The default print setup will print the entire GIS map only on a letter-sized sheet to the default printer. The print setup may be changed using File >> Printer Setup.

Accessing The GIS Reports Shapefile

The GIS Reports are a series of preset views that allow the user to see a variety of information about their database in a GIS view (See Chapter 8 Reports for more information on generating GIS Reports). There are three GIS views: Inventory, Last PCI, and Assignment Of PCI Deterioration And M&R Families.



If the user has a linked shapefile, then a GIS Report can be generated by clicking on Visual Menu >> Reports >> GIS Reports, and then selecting the type of report. After the GIS view appears, a report shapefile has been generated. To view this shapefile first close MicroPAVER. Then navigate to C:\ EMS Program Files\User Data\ and click on your specific project folder. Within the project folder there will now be a folder named GISView- Inventory (if it was the Inventory GIS Report that was generated). These individual shapefiles can be copied and pasted to another location on the users computer, and then manipulate as needed in a GIS program such as ArcView.

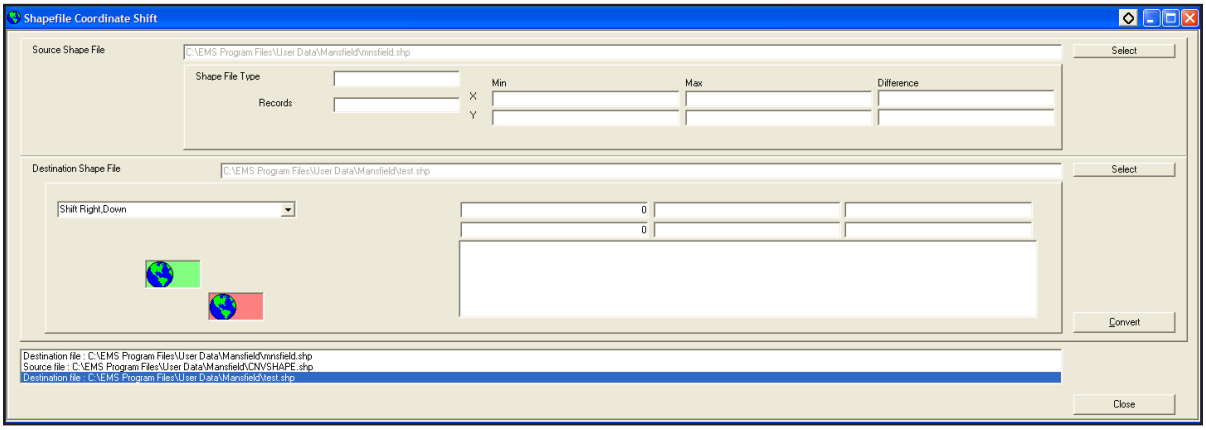
The Inventory GIS Report is sort of all inclusive- as it contains essentially every field in PAVER™ for the associated database. Often, a user will want an Excel or dBase file showing all of the individual

PAVER™ attributes for their database. Once an Inventory shapefile is generated, it will have a .dbf file as part of it The .dbf file contains the shapefiles attribute information, and it can be opened and converted in Microsoft Excel, as well as a number of other programs, depending on the user's needs.

Shapefile Coordinate Shift

The Shapefile Coordinate Shift module functions like the PAVER™ Shapefile Converter discussed above, but this module also allows you to shift the coordinates of the shapefile during conversion. The Shapefile Coordinate Shift is divided into three sections. The first section displays the Source Shapefile, the second section displays the Destination Shapefile, and the third section displays the results of the conversion process. First locate the shapefile you wish to convert by clicking Select, and browsing for the appropriate files.

Once the file is selected, PAVER™ checks that the file contains a UNIQUEID and PID. The coordinates of the selected shapefile are displayed. Once the file is loaded, click Select in the Destination Shapefile area of the box. After selecting the destination file, you are then able to select the appropriate Shift Mode for the converted shapefile. You may select a pre-made shift mode or a User-Specified shift mode from the drop-down list box. To complete the conversion process, click Convert. As the conversion takes place, the results will be shown in the lower window.



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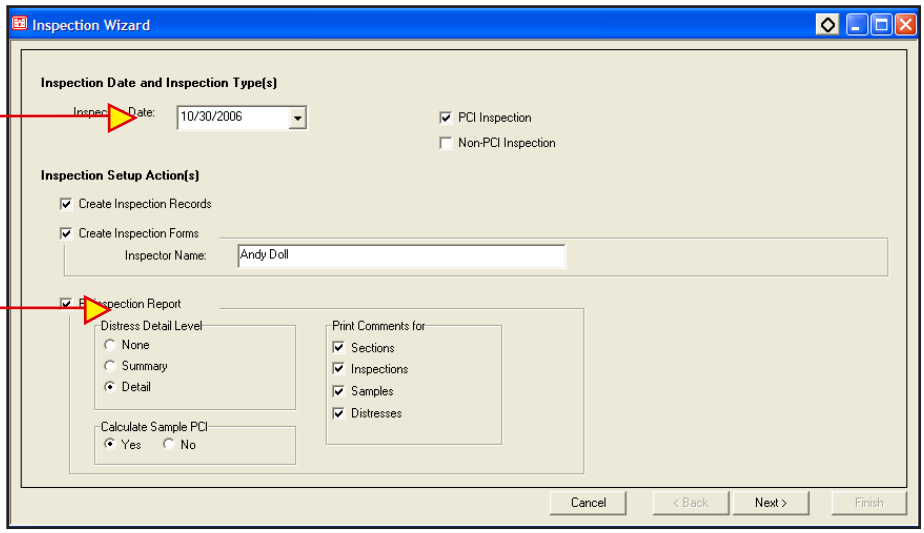
Inspection Setup Wizard

The Inspection Setup Wizard allows the generation of Inspection Records, Inspection Forms, and a Reinspection Report for the inspection process. The user is able to create these records, forms, and report, over multiple sections for the inspection.

Access the Inspection Setup Wizard from the PAVER™ Button Bar, by choosing Wizards. Start by entering in the Inspection Date and Inspection Type(s). Choose the desired action(s) of creating Inspection Records, Inspection Forms, and/ or a Reinspection Report, and specify the parameters. Then click Next to select the sections to be included with the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included. Click Next and PAVER™ will review the sections for inspection setup, in order to check for any sections with insufficient data. Run the Inspection Setup Wizard by clicking Apply, and PAVER™ will create the desired records, forms, and/ or report.

Select Inspection Date and type

Select desired options



Inspection Records

Before data from an inspection can be entered into PAVER™, Inspection Records need to be created for the sections that were inspected. Inspection Records consist of a record of the date of inspection. The Inspection Setup Wizard allows the creation of Inspection Records for multiple sections. If the user wishes to delete or edit an inspection record, or to add additional inspection data, this is done in the PCI form. Inspection Records can also be created one at a time for each section in the PCI form.

Inspection Forms

During an inspection, the use of Inspection Forms is a convenient method for recording the distresses. When an Inspection Form is created for a given section using the Inspection Setup Wizard, the form will include relevant information for that section such as PID, inspector name, inspection date, branch use, surface type, location details, and section dimensions. According to the surface type of the section, the form will additionally include a list of the pertinent distress codes for that type of surface. For each sample of a given section, the form will have an area to record the distress, the severity, and any sketch or comments. The user can print these Inspection Forms, and conduct surveys and inspections using the forms. When viewing these forms, PAVER™ will show them as a continuous

page, but will print separate pages for each section. Example Inspection Forms can be found in Appendix E.

Reinspection Report

The Reinspection Report is designed to produce a listing of information about the last inspection for each section included in the report. The Reinspection window offers several options for configuring the report:

- Distress Details: This section gives you the option to display recorded distress information from the last inspection in three levels of detail (Remember: Distresses are entered at the sample level and are associated with a specific inspection date.):
  - None: No distress details shown.
  - Summary: Distress code and severity level of each distress in the sample unit are shown.
  - Detail: Complete details for every distress listed in the current sample are shown.
- Calculate Sample PCI: This produces a PCI for each sample listed. Although PAVER™ works with section-level PCI's throughout the program, this shows the PCI of each inspected sample.
- Report Sample Ordering: This gives you control over how the Reinspection Report sorts and orders the samples in each section – numerical or alphanumerical. Your choice is based on how you have chosen to name your samples.
- Print Comments Print Options: Checking any combination of these boxes enables the report to display comments that were entered at that level. Within the program, you can enter comments in a text field, at any of those levels – here is where those comments can be printed out.

Now that you have configured your report, click Next to bring up the EMS™ Query Tool. At this point, you can select the whole database or specific sections to be included into the report. Click Next once sections are selected with the Query Tool (saying Next to an empty query selects the entire database). PAVER™ will review the sections for inspection setup, in order to check for any sections with insufficient data. Click Apply to run the Inspection Setup Wizard and PAVER™ will create the desired records, forms, and/ or report.

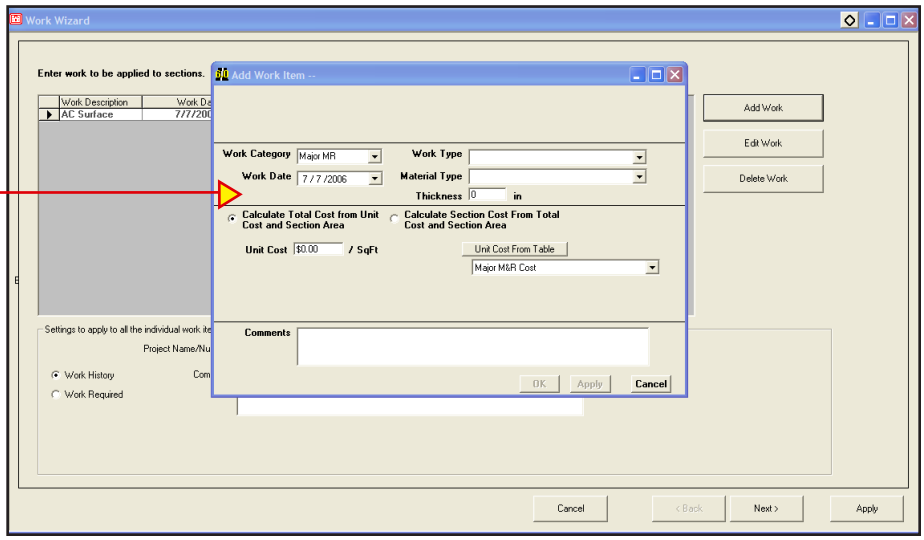
Work Entry Wizard

The use of the Work Entry Wizard is a convenient way for the user to apply multiple work items to multiple sections, as well as have the option to create a work history report. Once work items are added to sections, the user does not have the ability to delete or edit any of the items in the Work Entry Wizard. However, this can be done in the Work form on a per section basis.

Access the Work Entry Wizard from the PAVER™ Button Bar, by choosing Wizards. Start by clicking Add Work to start creating work items to be applied. A new window titled Add Work Item will appear, allowing the user to specify the parameters for an individual work item being added. Parameters include work category, work type, work date, material type, and thickness. Selecting Calculate Total Cost from Unit Cost and Section Area, causes PAVER™ to automatically look up the Unit Cost according to the Unit Cost From Table, relative to the Work Category that was chosen. The user also

has the option to select Calculate Section Cost from Total Cost and Section Area, and then enter in the Total Cost. Comments can be added which will be linked to the individual work item being entered. After entering in all the parameters for the work item, click OK if finished, or click Apply to enter another work item. Choosing Apply clears the window, allowing the user to repeat the same steps of adding a work item.

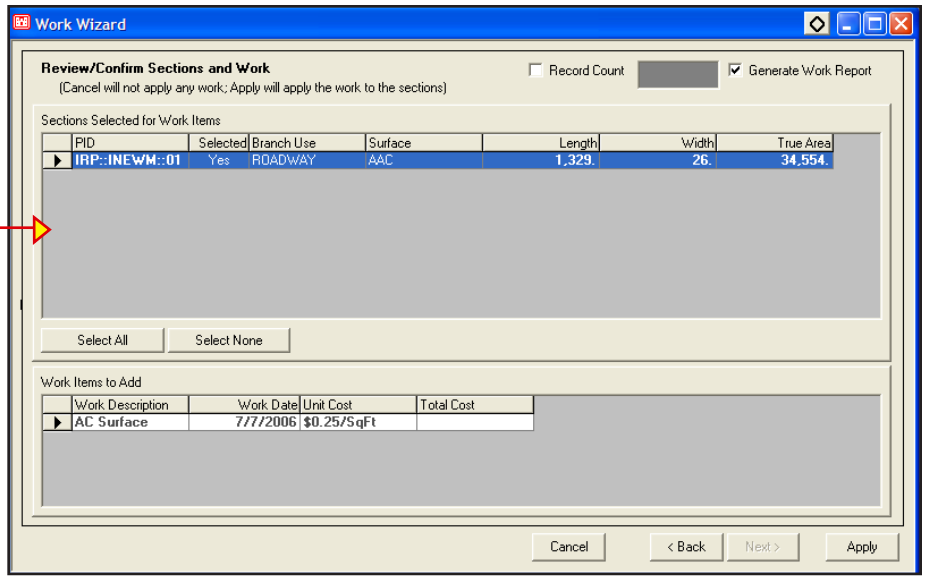
Add work items and parameters



After entering all the work items, PAVER™ will list them in the Work Wizard window, where the user is able to review them and edit or delete any as necessary. In the Settings to apply to all the individual work items, the user can specify whether the work items that are being entered are Work History or Work Required items. The user can also add Project Name/ Number, Phase, and Comments. These settings will be applied to all the work being applied to sections. When finished, click Next to continue. Next, select the sections for the work items to be applied to utilizing the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included. After selecting the desired sections, click Next and review the list of the Sections Selected for Work Items and the Work Items to Add. The user has the option of generating a work history report by selecting Generate Work Report. Run the Work Entry Wizard by clicking Apply, and PAVER™ will apply the work items to the sections entered.

Note
Once work items are added to sections, the user is not able to delete or edit any items in the Work Entry Wizard.

Review sections for work items to be added to



Calculate Last Construction Date

The Calculate Last Construction Date Wizard is utilized to determine the most recent construction date for selected sections. The wizard conducts the calculation according to a specified deterioration rate, and discards any inconsistent data.

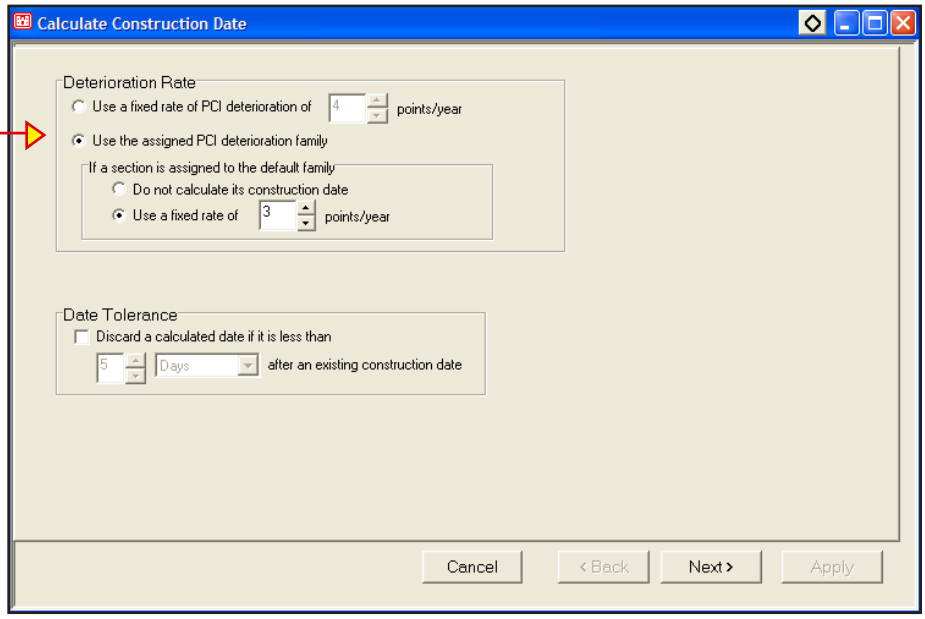
> *Note*
> *If calculated dates are before an existing construction date, PAVER™ will automatically discard the calculated date.*

Access the Calculate Last Construction Date Wizard from the PAVER™ Button Bar, by choosing Wizards. First, choose the Deterioration Rate. Selecting Use a fixed rate of PCI deterioration, will enable PAVER™ to use the current PCI and linearly backtrack to the construction date (to a PCI of 100) with the specified points per year. Selecting Use the assigned PCI deterioration family, causes PAVER™ to use the current PCI, and the assigned PCI deterioration family model, to determine the construction date. For sections assigned to the default family, the user can choose not to calculate its construction date or to Use a fixed rate of a specified points/ year. Under Date Tolerance, the user has the option to Discard a calculated date if it is less than a specified time interval after an existing construction date. This allows PAVER™ to keep any existing construction date that is reasonable, when compared to the calculated date. If the calculated date is less than the existing construction date, the calculated date is automatically thrown-out and will not be used. After selecting calculation parameters, click Next and Select the sections to be included with the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included.

Select Calculate to run the Calculate Last Construction Date Wizard. PAVER™ will display the Results, listing the sections and relevant information such as the calculated construction dates. Select Show rejected dates, and PAVER™ will display any sections that were discarded (any sections with calculated dates before existing dates, or sections not meeting the specified tolerance). Review the results and deselect any sections you do not want the new calculated construction date applied to. The user can click Select All or Clear All, which will select/ clear all the sections in the Results table, or the user can select/ clear a section one at a time in the table. Select A Subset, allows the user to create a subset of sections to select. The Generate Work Report checkbox allows the creation of a work

report for the sections. Once the results are reviewed, click Apply and PAVER™ will assign the new calculated construction date to the selected sections and generate a work report if desired.

Select desired deterioration rate for calculation



All PAVER™ calculated last construction dates can be viewed using User-defined Reports. To view all of the sections that have had their last construction dates calculated, select Visual Menu >> Reports >> User-defined Reports >> Create New Report. Select all of the standardized columns used when creating a report (Network ID, Branch ID, Section ID, Date, etc.), and then highlight Latest Work on the tree selector and open the Select Rows tab. In the Field list box, select Work. In the Comparison list box, select =. In the Compare To list box, select Back-calculated Construction. Once the drop-down list boxes are defined, select OK to view all of the sections that have had their last construction dates calculated.

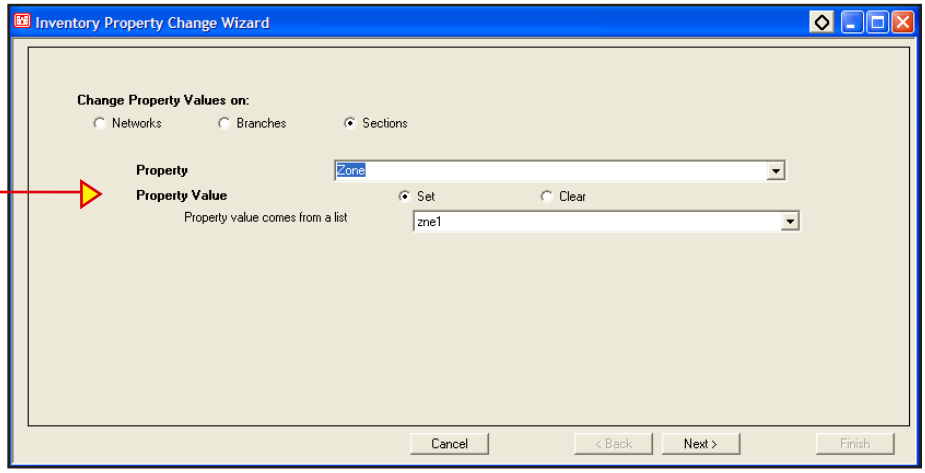
Set Properties On Multiple Inventory Items

The Inventory Property Change Wizard is utilized to update or clear a specified inventory property for selected sections. This wizard is limited to inert properties which do not affect the PCI calculations or prediction modeling of family models.

Access the Inventory Property Change Wizard from the PAVER™ Button Bar, by choosing Wizards, and then Set Properties On Multiple Inventory Items. Start by specifying the property to revise. Under Change Property Values on, select the type of the property as Networks, Branches, or Sections. PAVER™ will then provide a list of available properties in the Property drop-down list box, where the user can select the property to change. Once the property is selected, PAVER™ will display the available actions that can be performed on the property. Selecting Clear will clear the specified property of the sections. If allowed, the user can also Set or change a property of the sections. If the Property value comes from a list, PAVER™ will provide the list where the user can select the value to set the property to. If the Property value is a number, then the user is able to enter in the value which the property is set to. Once the desired property and action is specified, click Next and select the sections to update/ clear with the EMS™ Query Tool. Select All includes all sections, whereas choosing Select Subset allows the user to build a subset of sections. Choosing Select None and clicking Next will allow the user to utilize the GIS/ Tree Selector to select the section(s) to be included. After selecting the desired sections, click Next and PAVER™ will display all the sections

that will be changed, allowing the user to review items that will be changed, and to deselect any changes that they do not want to take place. Run the Inventory Property Change Wizard by clicking Apply and PAVER™ will update the selected sections.

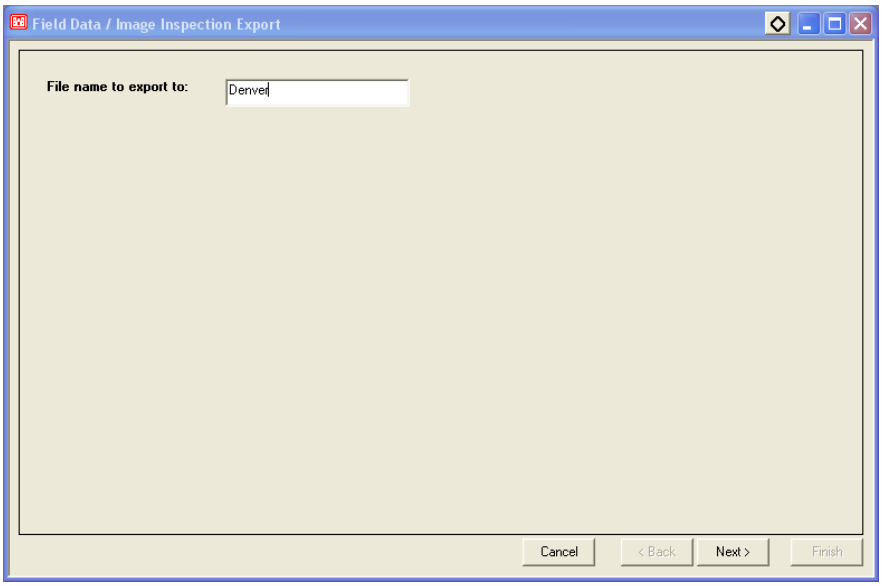
Select new property values



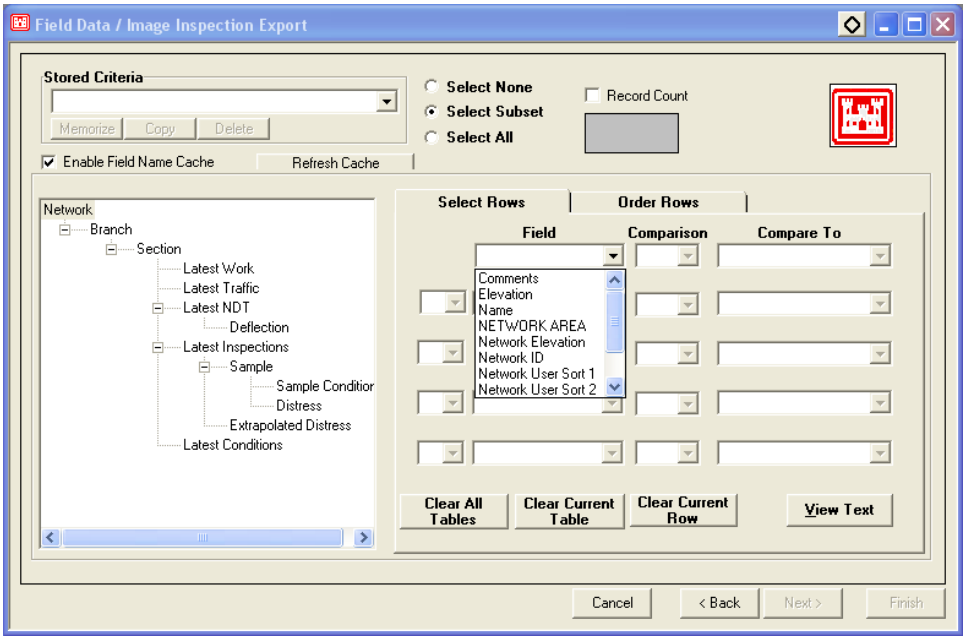
FieldInspector™/ ImageInspector™ Data Inspection Export

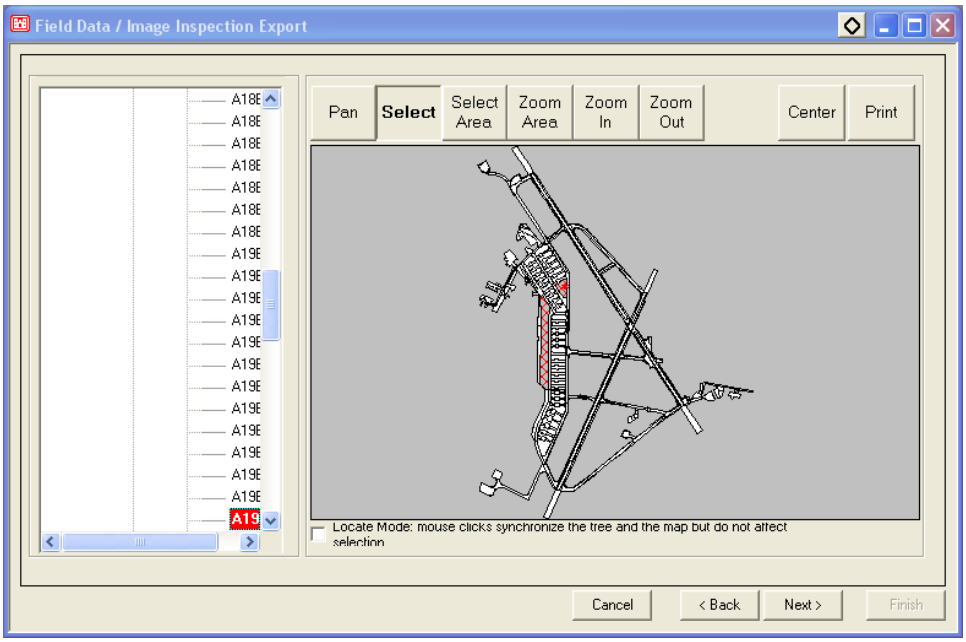
Version 6.5 includes a new feature to export sections to be surveyed in preparation for use in the PAVER™ FieldInspector™ / ImageInspector™. This Export tool uses an *.I70 file to export information about sections to be surveyed in the PAVER™ sister programs. This wizard provides a step by step procedure to export data to be used by the PAVER™ FieldInspector™ / ImageInspector™. Access the PAVER™ FieldInspector™ / ImageInspector™ Data Inspection Export Wizard from the PAVER™ Tool Bar, by selecting Wizards.

The FieldInspector™ / ImageInspector™ Data Inspection Export Wizard contains five display screens. The first display screen seen below prompts the user to define the file name to export to. After this has been defined, the Next button on the bottom of the wizard will become active.

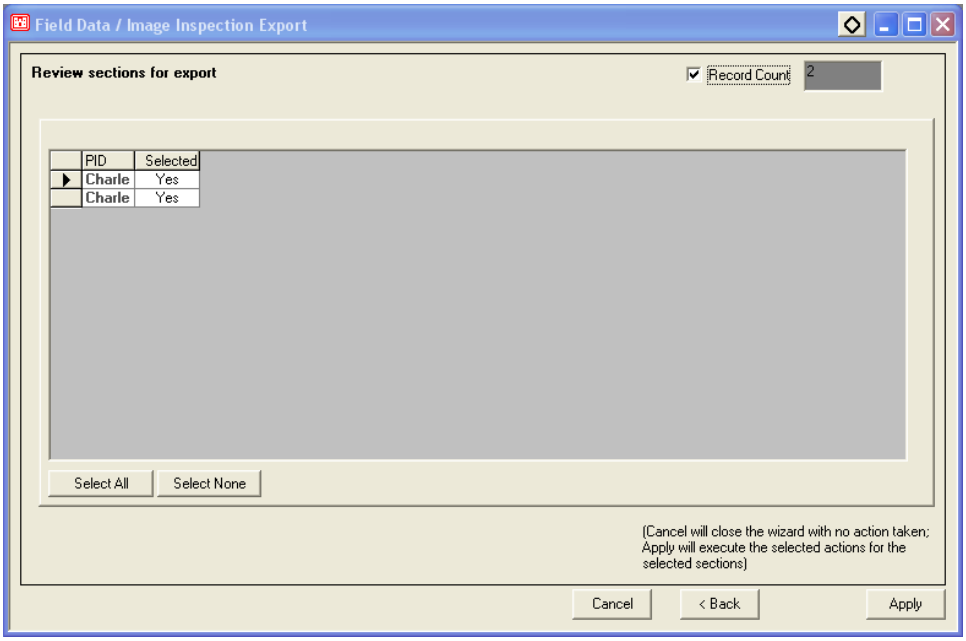


The second screen displayed below is a query tool. This tool lets the user define what sections are going to be surveyed. The user can define a group of sections at this time or after Next is selected they can redefine or further define a selection based on a GIS map. This screen shot is also displayed below.

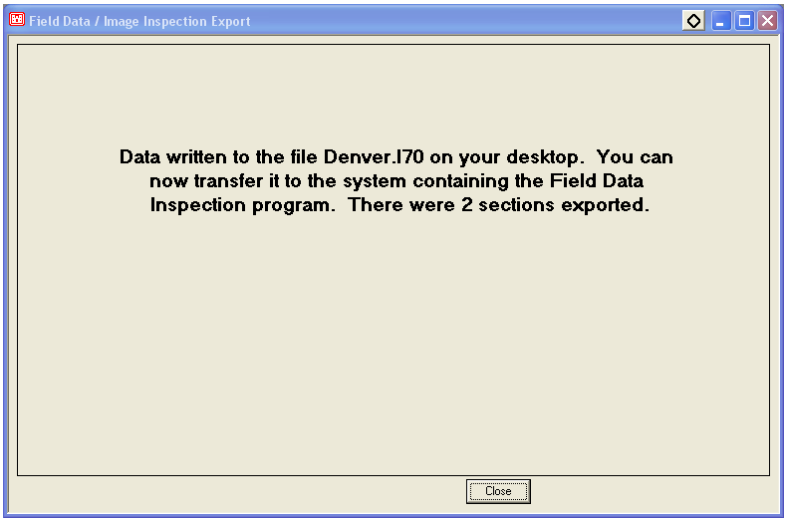




After a final selection has been made and Next is selected on the GIS selection tool, the following screen will appear. This screen summarizes what sections have been selected to survey. Further revisions can be made by individually picking in the Selected column.



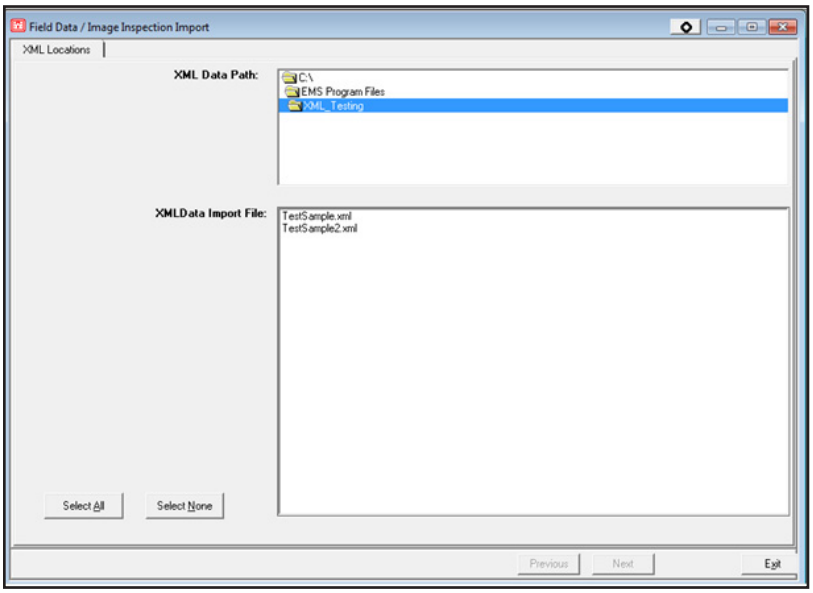
After review, select Next, PAVER™ will place the named *.I70 file on the computers desktop with the associated name defined on screen shot 1 above. Now all sections selected are ready to import into the FieldInspector™ / ImageInspector™ and ready for use in a pavement condition inspection survey. The*.I70 file also contains a linked copy of the GIS shapefile that is associated with the main PAVER™ inventory.


Field Data / Image Inspection Export
Data written to the file Denver.I70 on your desktop. You can now transfer it to the system containing the Field Data Inspection program. There were 2 sections exported.
Close

FieldInspector™/ ImageInspector™ Data Import (XML)

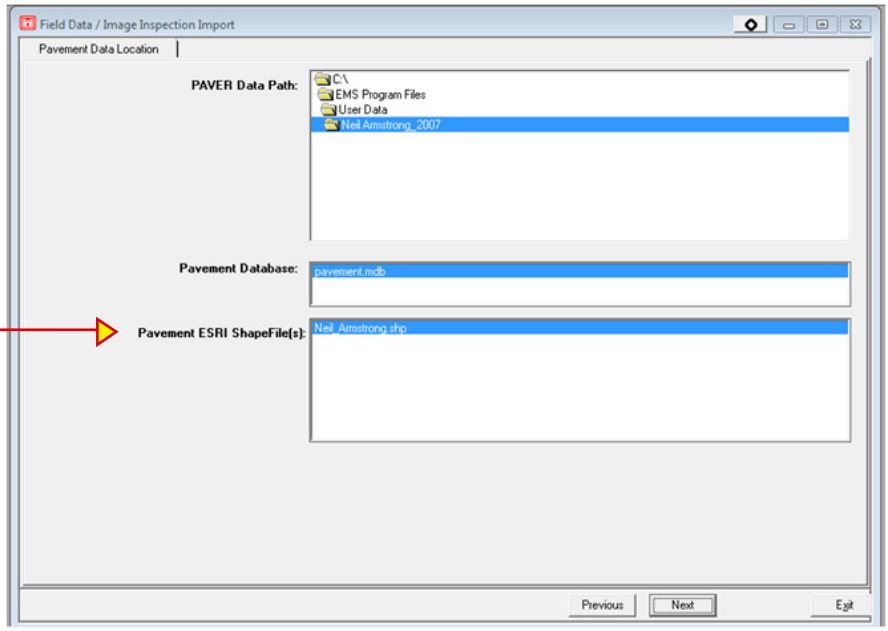
Version 6.5 includes a new method to import survey information into a database. This import tool uses an XML file to import survey conditions at the frame, sample, or section level. Using a specified XML format (XML format defined in Appendix B), PAVER™ includes a wizard to help guide the user through the import process. This wizard also provides data verification to insure that survey information is being imported properly into the database. Access the XML FieldInspector™ / ImageInspector™ Data Import Wizard from the PAVER™ Button Bar by choosing Wizards.

The FieldInspector™ / ImageInspector™ Data Import (XML) Tool contains five display screens. The first display screen is the XML file location. It shows the XML Data Path and the corresponding XML Data Import Files for the inspection data. The XML Data Path is how the user navigates to the location of the files that will be imported to create the PAVER™ inspection data. The XML Data Import File is where the individual XML files can be selected for import.



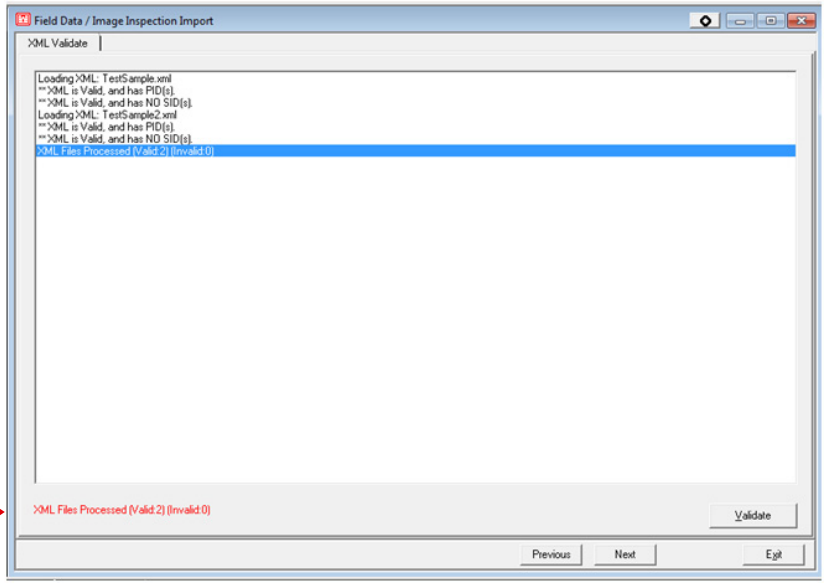
The second display screen is the PAVER™ Data Path, where the PAVER™ database currently open is selected and the associated shapefile inside the pavement database project folder is used for the XML inspection data import. The shapefile interpretation is only needed if the PID information is not known and the import will be based on the distress GPS conditions. The data will be assigned to the georeferenced GIS map during import.

Distress data's associated shapefile



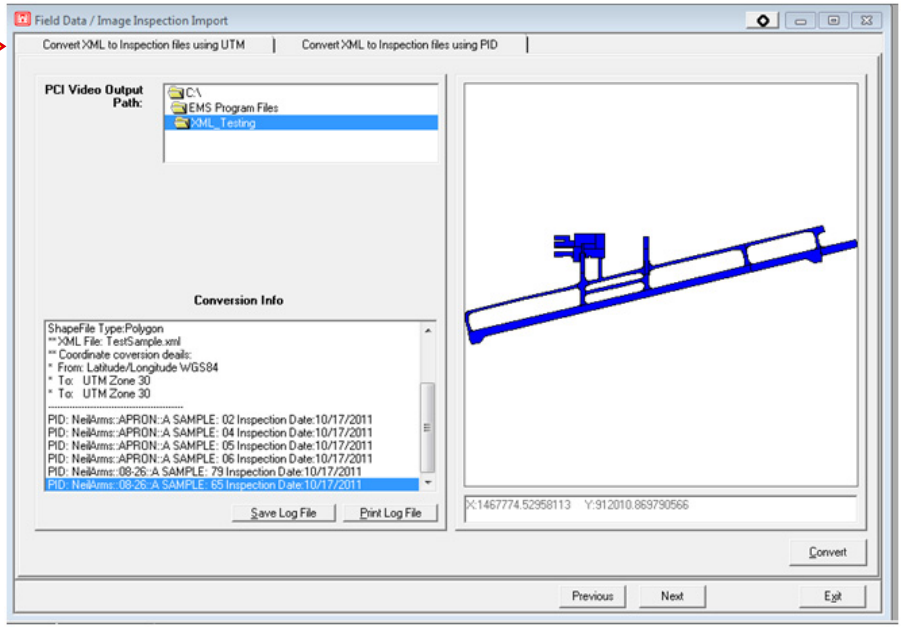
The third display screen searches for all valid and invalid XML files that were selected for import. This allows the user to remove or correct any corrupted information before the inspection information is converted and imported into PAVER™.

Valid and invalid XML data files

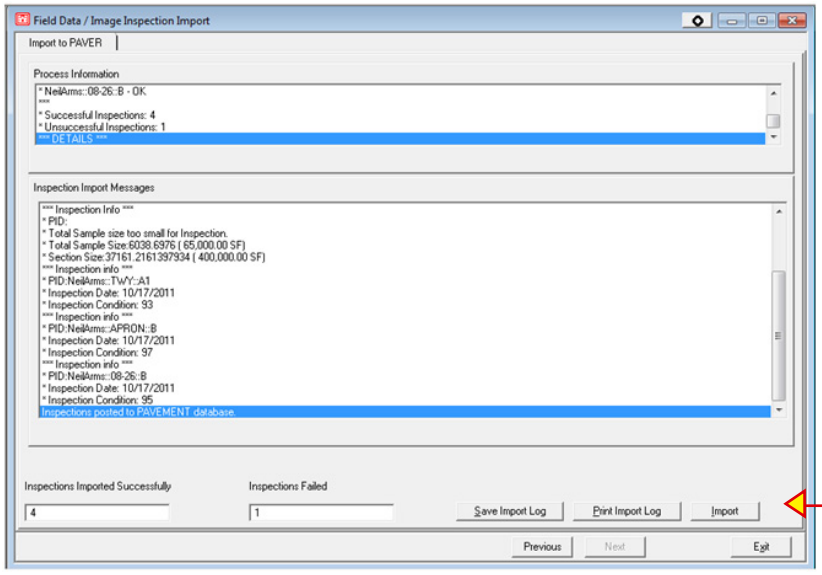

Field Data / Image Inspection Import
XML Validate
Loading XML: TestSample.xml
** XML is Valid, and has PID(s).
** XML is Valid, and has NO SID(s).
Loading XML: TestSample2.xml
** XML is Valid, and has PID(s).
** XML is Valid, and has NO SID(s).
XML Files Processed (Valid:2) (Invalid:0)
XML Files Processed (Valid:2) (Invalid:0)
Validate
Previous
Next
Exit

The fourth display screen converts XML data to inspection files using either PID or UTM. After the files are converted the user can choose to print or save the log files containing the conversion information.

Inspection file conversion methods



The fifth display screen is the final step to importing the inspection data. By selecting import the user will have added the inspection data to the database. The number of successful as well as failed imported inspections are listed along with process messages and inspection import messages.



Select Import to add inspection data to PAVER™ database

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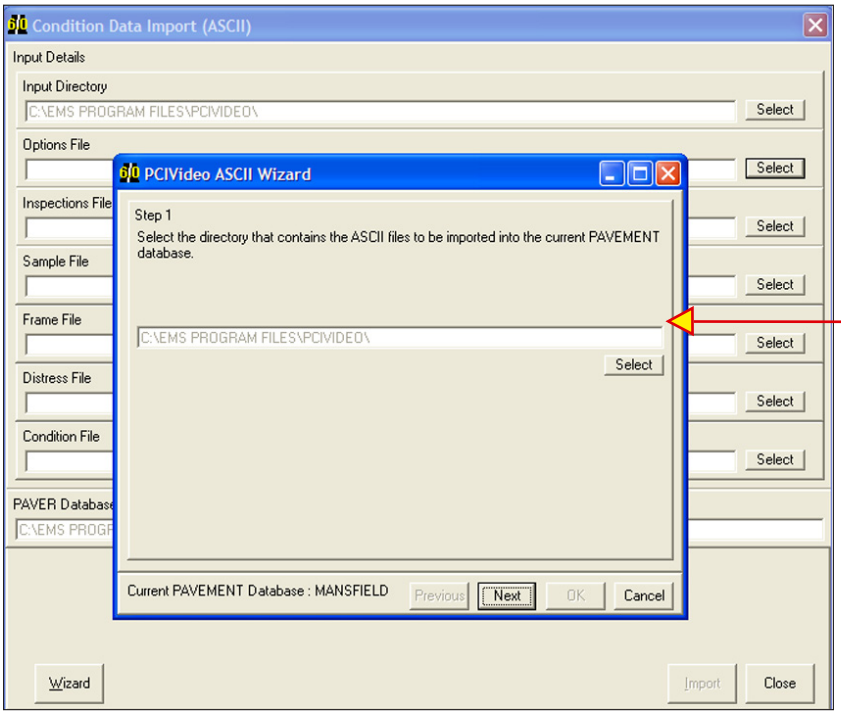
Condition Data Import (ASCII)

The Condition Data Import (ASCII) feature allows the user to import data into PAVER™ using ASCII file format. Upon launching the feature, a file wizard is opened to help guide PAVER™ towards the appropriate data files. For examples of how to format files for ASCII Video Inspection Import, see Appendix B.

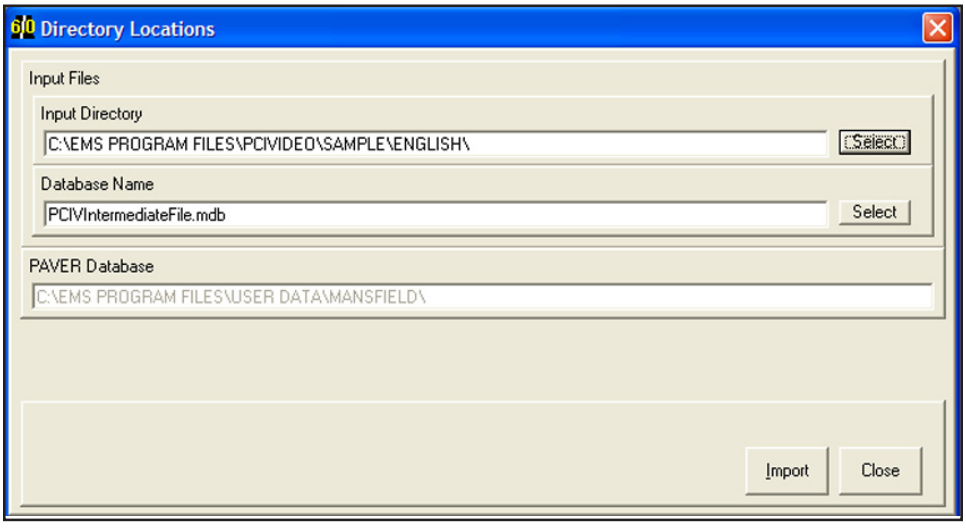
Note
The user can either use the wizard to locate the files, or locate the files one-by-one without the wizard.



The ASCII Condition Data Import Wizard helps guide PAVER™ to the correct files

Condition Data Import (Database)

The Condition Data Import (Database) feature allows the user to import data into PAVER™ using *.mdb file format. Locate the database file to import by first selecting the Input Directory, and then selecting the Database Name. For more information on video inspection import data format for Access Databases, see Appendix B.



Handheld Data Import

Pocket Inspector Software And Pocket PC Devices

The market for handheld devices is immature and still changing rapidly. Microsoft and hardware vendors (mostly Compaq and Hewlett-Packard, who have now merged) have produced several generations of devices and their operating software. Unfortunately, the different generations are (by and large) not compatible. There have been five generations of handheld devices that run the Microsoft operating software (for a more detailed history, see http://en.wikipedia.org/wiki/Pocket_PC#Versions):

1. The first generation was released in 1999. It received little use and we will ignore it here.
2. The second generation was released in 2000. There were two classes of devices, called "Pocket PC" and "Handheld PC". This generation was sometimes also referred to as "Pocket PC 2000". This generation ran version 2.x of the Windows CE operating system.
3. The third generation was released in 2002, and was called "Pocket PC 2002". This generation ran version 3.x of the Windows CE operating system. This is the generation for which the Pocket Inspector software was designed.
4. The fourth generation was released in 2003 and was called "Pocket PC 2003" or "Windows Mobile 2003". There was also a version called "Windows Mobile 2003 SE". For our purposes, these two versions are identical. Both run the Windows CE 4.2 operating system. With the addition of special packages, this version was able to run some of the software written for the previous version.
5. The current (fifth) generation was released in May 2005 and is called "Windows Mobile 5.0". It runs version 5.0 of the Windows CE operating system. With this version, Microsoft abandoned backward compatibility with Pocket PC 2002.

There are two versions of the PAVER™ pocket inspector software, Pocket Inspector 1.0 and Pocket Inspector 1.1. The table below shows the relationship between the device versions, pocket inspector versions and PAVER™ versions.

Device	Pocket Inspector 1.0	Pocket Inspector 1.1
Pocket PC 2000	Does not run	Does not run
Pocket PC 2002	Runs with PAVER™ 5.0 thru 5.2.3	Does not run
Windows Mobile 2003	Does not run	Runs with PAVER™ 5.2.4 through PAVER™ 5.3 on some devices (see below)
Windows Mobile 5	Does not run	Does not run

The Windows Mobile 2003/Pocket Inspector 1.1 combination has only been tested on two devices:

- On the HP iPAQ h6315, the software works correctly.
- On the HP iPAQ hx4700, the drop-lists in the software do not work correctly (after a list is dropped once, subsequent drops only show a single item and it is difficult to select). Other operations appear acceptable.

Inspection Data Entry Using A Windows CE Handheld Device

Hardware/Software Requirements

For the installation of the Handheld PCI Inspector program, a handheld device with the Windows CE operating system and Microsoft Pocket Access is required. In addition, Microsoft Active Sync must be installed on the computer (herein referred to as "main computer") that inspection information will be downloaded from and uploaded to. Additionally, PAVER™ must be installed on the main computer.

Software Installation

First, install Microsoft Active Sync on the main computer. Microsoft Active Sync is a free program that can be downloaded from www.microsoft.com. Second, link the handheld device to the main computer by connecting the two via serial port or USB port, and launch Microsoft Active Sync. When prompted by Microsoft Active Sync to setup a partnership with this computer, select "Guest Partnership" and then "Next".

Note: A partnership is used when the synchronizing of files on the handheld and PC are desired—this is not necessary for this PAVER™ application.

To install the necessary software to the handheld device, select the install file from the handheld installation CD.

Software Operation

In an effort to expedite the Pavement Condition Index (PCI) field inspection process, PAVER™ has the added capability of interacting with Windows CE handheld devices. This capability was developed as an add-in to PAVER™ and currently ships with PAVER™ 6.

Handheld Data Import is accessed in PAVER™ through the Add-ins menu. Data for field inspections can be downloaded from PAVER™ to a Windows CE, handheld device that has the Handheld PCI Inspector program installed.

Typically when preparing for a field inspection, the first step is to download the sections to be inspected to the Windows CE handheld device. Data transfer between the main computer and the Windows CE device is facilitated with Microsoft Active Sync. With Microsoft Active Sync, sections to be inspected may be transferred from the main computer to the Windows CE handheld device, using the Download Sections to Inspect tab available through the PAVER™ Add-ins menu. Once the appropriate sections are transferred to the handheld device, the handheld device is ready for use in the field.

After the inspection has been completed, the data on the Windows CE handheld device must be backed-up using the Backup Inspection Data tab that is accessed through the PAVER™ Add-ins menu. The backed-up data may then immediately be imported into PAVER™ or imported at a later date. To import the data, the third tab, labeled Import Backup Data into PAVER™, is used. During the data import, all distress information is transferred to the appropriate PAVER™ database on the main computer.

The Handheld Data Import option in the PAVER™ Add-ins menu, launches a window with three tabs that perform three different tasks. The first tab is used to Download Sections to Inspect. The second tab is used to Backup Inspection Data after an inspection has been performed. The third tab is Import the Backup Data into PAVER™. If no device is detected

by PAVER™, you are only allowed to use the third tab to import previously backed-up data into PAVER™.

Download Sections To Inspect

When downloading sections to inspect, the user has available three methods to select the sections to download to the handheld device. Make sure that there are no programs running on the handheld before the transfer of data.

1. The first method is to Use PAVER™ Selections, which allows the user to select the desired sections using any of the PAVER™ Selectors, such as the Tree Selector. Sections selected using the Tree Selector are automatically placed in the download queue.
2. The second way to choose the sections to download, is to Use the Inspection Schedule, which allows the user to choose sections based upon their Inspection Schedule. Based on the Inspection Schedule selected, PAVER™ automatically selects the appropriate sections to inspect.
3. The final method to choose the sections to download is to Use the Query Tool, which uses the PAVER™ Query Tool to search for all desired sections.

Note
When sections are downloaded to the handheld device, the data on the handheld device is overwritten. Make sure that all data is backed-up prior to downloading sections.

Once the desired sections are found using the second two methods, click Add Items to move the sections into the download queue. To remove a section from the queue, just highlight the row or rows to be removed, and click Remove. As soon as all the desired sections are cued, click Transfer and the sections are downloaded into the handheld program. This overwrites any inspection data that is on the handheld. Be sure that all data from the handheld has been backed-up into PAVER™ before transferring new data to the handheld. Fortunately, PAVER™ alerts the user if data that has not been backed-up is about to be overwritten.

When writing a comment, the user must first make sure that the cursor is located in the comment box. Any added section, sample, or distress may be deleted by clicking Del. Sections downloaded from PAVER™ cannot be deleted. The user may calculate the PCI for a section by clicking Calc on any of the three tabs. To see a detailed calculation of the PCI and Structural PCI, select the Details checkbox before performing the calculation. The calculated PCI and Structural PCI can also be seen on the Sections tab after calculations have been done.

Hint
When writing comments or entering data, make sure the cursor is located in the correct box before using the pen recognition function on the handheld device.

Backup Inspection Data

Once the inspection data has been collected using the handheld device, the user must Backup the Inspection Data using the second tab from the Add-ins menu. After connecting the handheld device to the main computer using Microsoft Active Sync as before, go to the Add-ins menu and select Handheld Inspector. Using the second tab, Backup Inspection Data, select the appropriate file to be backed-up. Once a name is selected, click Backup to create the backup file. The backed-up files are automatically placed in the following directory: EMS Program Files\User Data*Name of Current Open Database*\ PI-Backup Data\. Since the backup files are put in these locations, it is important to be in the correct database when backing-up files and importing files from the handheld device.

Note
For sections downloaded from PAVER™, you are only allowed to edit the number of samples, or to change the evaluation method from samples to frames.

Inspections Using The Handheld PCI Inspector

After data has been transferred to the handheld device, field inspections may be carried out using the Handheld PCI Inspector program. The Handheld PCI Inspector program is separated into three tabs: Sections, Samples/Frames, and Distresses.

The Sections tab enables the user to view downloaded sections, add new sections to inspect, or add comments. Downloaded and added sections appear in the large text box, listed by network, branch, and section names. When adding a new section, the user can edit network, branch, and section names, along with the use, surface, area, number of samples or frames, and age.

The Samples/Frames tab allows the user to edit or add specific samples/frames. Downloaded samples/frames appear in the large text box. Unlike the Sections tab, the user may delete or edit any downloaded samples/frames. In addition, a sample may be declared to have no distresses by clicking the No Distress checkbox.

The Distresses tab allows the user to enter the distresses for each inspected sample/frame. The current sections and samples/frames are indicated at the top of the screen, and may be switched by clicking the left or right arrows on either side of the section or sample/frame ID. To add a new distress, click New. The distress type then can be picked from the list of distress types, or entered into the text box. Distress severities are selected from the pull-down menu (if applicable) and distress quantities may be entered directly. To save the entered distress data, use Save. If a sample has no distresses, click the No Distresses checkbox, under the Sample/ Frames tab. When working with frames, if a new frame is desired click New Frame, and a new frame is added with the same attributes as the previous frame.

When adding a new section, sample, or distress, the user must first click New, and then click Save, after editing the appropriate fields. The user must remember to select Save after editing existing sections, samples, or distresses. Data may be entered by using the keyboard, the number keypad, or handwriting recognition for all data entry text boxes. Make sure that the cursor is located in the box that you wish to enter data into. When using the number keypad, highlighted text cannot be overwritten – the user must click C to clear the text prior to entering the data. Comments may be added to any distress, sample, section, or inspection by clicking Comments, and either writing or typing the comment in the box.

Import Backup Data Into PAVER™

Hint
When downloading and importing data, make sure the correct PAVER™ database is online.

After backup files have been created, the user may then Import Backup Data into PAVER™ by using the third tab on the Handheld Inspector menu. First select the backup file to import by hitting Select and choosing from the list.

PAVER™ automatically places and selects files from a default location: EMS Program Files\User Data*Name of Database*\PI-Backup Data\.

After selecting the backup file, select the inspection date to apply to the data. If some sections were not inspected or a different inspection date is required for some sections, check the box next to the sections that should be skipped.

Click Transfer to PAVER™, to transfer the files into PAVER™. The transfer results indicate what sections where successfully imported and which ones were not. If a section has no inspection information, the information is not imported into PAVER™ for that inspection date. If desired, the transfer results may be printed by clicking Print at the bottom of the tab.

PAVER™ Shapefile Converter

Converting From PAVER™ 4.x to 6

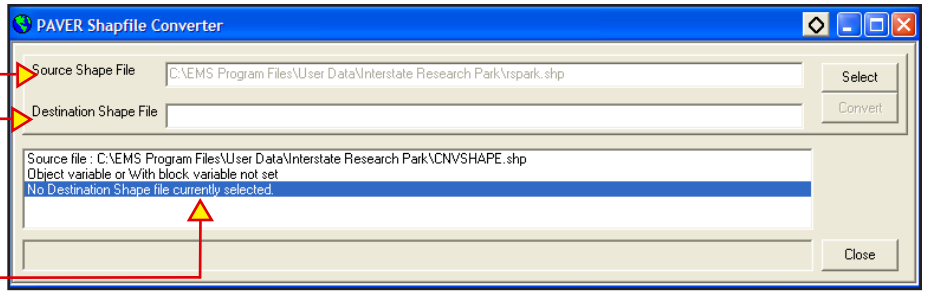
Note
When converting shapefiles, the database that is to be associated with the shapefile must be online for the procedure to work correctly. Additionally, all the files that go with the shapefile (.shp, *.dbf, *.sbn, and *.shx) must be in the same folder when converting.*

The PAVER™ Shapefile Converter is used to convert shapefiles that were used in version 4.x of PAVER™ to be used in version 6 (as well as version 5.3) of PAVER™. The difference between shapefiles in version 4.x and version 6, is that in 6 shapefiles now contain a Unique ID. The conversion of the shapefile will verify that the file contains a Unique ID, and will add the field if necessary. Converting coverages from PAVER™ 4.x to 6 is a two-step process. First take the PAVER™ 4.x coverage file into ArcView, and convert the *.cov file to a shapefile (*.shp). To complete the process, the shapefile must be converted using the PAVER™ Shapefile Converter. Once the shapefile is converted, the process is completed.

Select the source shapefile

Destination of the converted shapefile

Results of the shapefile conversion


PAVER Shapfile Converter
Source Shape File
C:\EMS Program Files\User Data\Interstate Research Park\rspark.shp
Select
Destination Shape File
Convert
Source file : C:\EMS Program Files\User Data\Interstate Research Park\CNVSHAPE.shp
Object variable or With block variable not set
No Destination Shape file currently selected.
Close

Shapefile Conversion Procedure

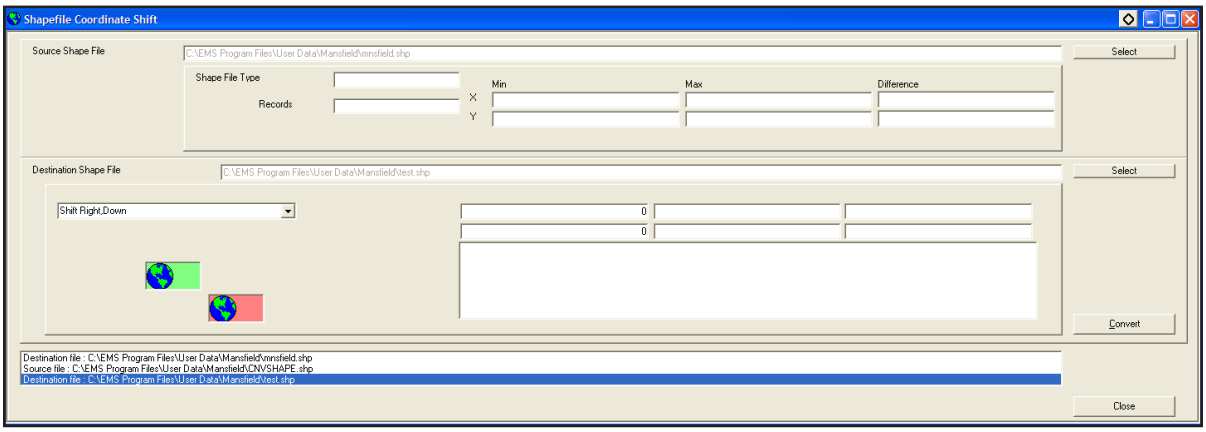
The PAVER™ Shapefile Converter module contains three sections. The first section displays the Source Shapefile, the second section displays the Destination Shapefile, and the third section displays the results of the conversion process. You must first locate the shapefile you wish to convert by clicking Select, and browsing for the appropriate files. Once the file is selected, PAVER™ checks that

the file contains a UNIQUEID and PID. PAVER™ automatically sets the destination of the converted file in the folder for the online database. To complete the conversion process, click Convert. As the conversion takes place, the results will be shown in the lower window.

Shapefile Coordinate Shift

The Shapefile Coordinate Shift module functions like the PAVER™ Shapefile Converter discussed above, but this module also allows you to shift the coordinates of the shapefile during conversion. The Shapefile Coordinate Shift is divided into three sections. The first section displays the Source Shapefile, the second section displays the Destination Shapefile, and the third section displays the results of the conversion process. First locate the shapefile you wish to convert by clicking Select, and browsing for the appropriate files.

Once the file is selected, PAVER™ checks that the file contains a UNIQUEID and PID. The coordinates of the selected shapefile are displayed. Once the file is loaded, click Select in the Destination Shapefile area of the box. After selecting the destination file, you are then able to select the appropriate Shift Mode for the converted shapefile. You may select a pre-made shift mode or a User-Specified shift mode from the drop-down list box. To complete the conversion process, click Convert. As the conversion takes place, the results will be shown in the lower window.



Appendix A

Inspection Information File Format (Standard And Extended Formats) 135

07 (AC Or GR) And 10 (PCC) Card Format 135

08 (AC Or GR) And 11 (PCC) Card Format 135

Inspection Information File Format (Standard And Extended Formats)

The following description is based on a "Card" model, where the "Cards" are now represented by lines in a text file. Files are in ASCII text, fixed width format.

Note: PAVER™ 4.1 and later support the extended branch and section number fields.

07 (AC Or GR) And 10 (PCC) Card Format

These cards contain section header information and supplemental inspection. One card required per section inspected.

Field Name	Format	Columns - Standard	Columns - Extended
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Riding	Alpha-Numeric	18-20	30-32
Safety	Alpha-Numeric	21-23	33-35
Drainage	Alpha-Numeric	24-26	36-38
Shoulder	Alpha-Numeric	27-29	39-41
Overall	Alpha-Numeric	30-32	42-44
FOD	Alpha-Numeric	33-35	45-47
Total No. of Samples in Section	Numeric	36-38	48-50

Select * from [Plan Parameters]

08 (AC Or GR) And 11 (PCC) Card Format

These cards contain sample unit and distress information. One or more cards are required per sample unit inspected and can contain up to four distresses per card. (I.E. A separate card may be used for each distress.) *nnnnn.nn is a decimal number*

Field Name	Format	Columns - Standard	Columns - Extended
Form ID	Numeric	1-2	1-2
Inspection Date	MMDDYY	3-8	3-8
Branch Number	Alpha-Numeric	9-13	9-18
Section Number	Alpha-Numeric	14-16	19-28
Add/Change/Delete	Alpha-Numeric	17	29
Sample Unit ID	Alpha-Numeric	18-20	30-32
Sample Type	Alpha-Numeric	21	33
Area/ No. of Slabs in Sample	nnnnn.nn	22-29	34-41
Distress Code	Numeric	30-31	42-43
Severity	Alpha-Numeric	32	44
Quantity	nnnnn.nn	33-40	45-52
Distress Code	Numeric	41-42	53-54
Severity	Alpha-Numeric	43	55
Quantity	nnnnn.nn	44-51	56-63
Distress Code	Numeric	52-53	64-65
Severity	Alpha-Numeric	54	66
Quantity	nnnnn.nn	55-62	67-74
Distress Code	Numeric	63-64	75-76
Severity	Alpha-Numeric	65	77
Quantity	nnnnn.nn	66-73	78-85

Appendix B

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XML Inspection Data Import Format (XML)

File Specifications for XML Interface to PAVER™

The XML Inspection Data Import provides a vendor independent format for transferring field inspection data to PAVER. An XML Schema "PavementInspectionData.xsd" has been developed to provide validation of data contained in the XML data files and can be found in the \EMS Program Files \Paver\Templates directory. The XML data dictionary layout is presented below.

The XML format presented above does include items that are not currently supported by PAVER™ but are there as place holders for future versions of the program. Other items included in the data dictionary are used for XML verification purposes. Below describes the common items used to import inspection data. Mandatory items for a proper XML import are denoted below.

The starting Reference node is "pavementData". An Attribute to this node is the data dictionary. The data dictionary is used to verify an XMLs format before importing it into PAVER™. Any XML errors during the format check will found when the XML is being imported using the PAVER™ XML import tool.

A child node to "pavementData" is "geospatialInspectionData". The "geospatialInspectionData" contains properties which are used throughout the XML statement. These attributes are:

- "InspectionDate" – All inspection data collected within the XML file will be associated with this date. It is in MM/DD/YYYY format. (Mandatory)
- "level" – This will be either "SAMPLE", "FRAME", or "SECTION" to indicate the mode of data collection. This property is Optional and if left out or blank will default to "FRAME".
- "Units" – This will be either "English" or "Metric" to indicate the need for numeric conversion during import. This property is Optional and if left out or blank will default to English.

Children of the "geospatialInspectionData" node include "inspectedElement", "inspectedCondition" and "inspectedComments". These nodes contain the information pertaining to the inspection.

The "inspectedElement" node contains direct attributes and children nodes. The children nodes are "startLocation", "endLocation", "centerLocation" and "inspectionData". The children contained in "startLocation", "endLocation" and "centerLocation" are "latitude" and "longitude". Each of these nodes contain these attributes:

- "degrees" – GPS string of degrees.
- "minutes" – GPS string of minutes.
- "seconds" -- GPS string of seconds
- "northSouth" (latitude only) – Represented by "N" or "S".
- "eastWest" (longitude only) – Represented by "E" or "W".

The child contained in "inspectionData" is "PCIDistresses".

The "PCIDistresses" nodes contain a child "levelDistress" which contains these attributes:

- "distressCode" – The code of the distress
- "quantity" – The measured size or number of the distress.
- "severity"– Represented by "L", "M" or "H"

Direct attributes defined for the "inspectionElement" node are:

- "inspectedElementID" – A unique identifier within a section and inspection date. (Mandatory)

- "size" – The size of the inspected element, corresponding to the "Units" attribute described in the "geospatialInspectionData" element above. (Mandatory)
- "PID" – This is the identifier of the section which owns this inspection. It is formatted as: "NETWORKID::BRANCHID::SECTIONID". (Mandatory if sectionUniqueid not defined)
- "sectionUniqueid" – Similar to the PID, this value describes which section owns this inspection. This ID is pre-generated by PAVER™ and can be used in place of the "PID" value. (Mandatory if PID not defined)

The "inspectedCondition" node contains the children "startLocation", "endLocation", "centerLocation" and "inspectionData". The children and attribute structure for "startLocation", "endLocation" and "centerLocation" are the same as described for the "inspectedElement" node above. Direct attributes for "inspectedCondition" include "PID" or "sectionUniqueid" as defined above. The child for "inspectedCondition" is "levelCondition" which contains these attributes:

- "condition" – Condition value. (If desired to import, Mandatory)
- "conditionText" – Test pertaining to condition value.
- "comment" – Inspection comments, if wanted.
- "cndMeasure" -- Type of condition being recorded. (If desired to import, Mandatory)
- "source" – Source of recorded data

The "inspectedComment" node again contains the children "startLocation", "endLocation" and "centerLocation". The children and attribute structure for "startLocation", "endLocation" and "centerLocation" are the same as described for the "inspectedElement" node above. Direct attributes for "inspectedComment" (If desired to import, Mandatory), "PID" or "sectionUniqueid" as defined above. (If desired to import, only one attribute Mandatory)

The XML tree node and attribute structure above describes common ways to import inspection data at different levels. The data dictionary used to verify xml formatting contains extra nodes not described above and only is used internally during the XML import into PAVER™. In the same location as the data dictionary, examples XMLs are provided to aid in the understanding of the structure. These example XMLs use the default database Roads and Parking in PAVER™. The following image depicts one of the example XML's importing at the sample level.

```
<pavementData xsi:noNamespaceSchemaLocation="PavementInspectionDataV2.xsd">
  <geospatialInspectionData inspectionDate="7/13/2008" units="English" level="SAMPLE">
    <inspectedElement inspectedElementID="0001" size="2500" PID="ROADPARK::PKUES::2">
      <centerLocation>
        <latitude degrees="28" minutes="28" seconds="8.262177" northSouth="N"/>
        <longitude degrees="80" minutes="32" seconds="38.72498" eastWest="W"/>
      </centerLocation>
      <inspectionData>
        <PCIDistresses>
          <develDistress distressCode="03" quantity="238.136804221442" severity="L"/>
          <develDistress distressCode="19" quantity="42.9508250808349" severity="M"/>
        </PCIDistresses>
      </inspectionData>
    </inspectedElement>
    <inspectedElement inspectedElementID="0002" size="2500" PID="ROADPARK::PKUES::2">
      <centerLocation>
        <latitude degrees="28" minutes="28" seconds="7.726593" northSouth="N"/>
        <longitude degrees="80" minutes="32" seconds="39.32922" eastWest="W"/>
      </centerLocation>
      <inspectionData>
        <PCIDistresses>
          <develDistress distressCode="19" quantity="243.108692233997" severity="M"/>
        </PCIDistresses>
      </inspectionData>
    </inspectedElement>
    <inspectedElement inspectedElementID="0003" size="2500" PID="ROADPARK::PKUES::2">
      <centerLocation>
        <latitude degrees="28" minutes="28" seconds="7.108612" northSouth="N"/>
        <longitude degrees="80" minutes="32" seconds="39.87854" eastWest="W"/>
      </centerLocation>
      <inspectionData>
        <PCIDistresses>
          <develDistress distressCode="19" quantity="244.657117518622" severity="L"/>
        </PCIDistresses>
      </inspectionData>
    </inspectedElement>
  </geospatialInspectionData>
</pavementData>
```

Video Inspection Import Data Format (ASCII Text)

File Specifications For PCIVideo Interface To PAVER™

Example User Interfaces

PCIVasc2PVR.exe

User interface for the use of Distress Data collected into ASCII files. It is recommended that the complete parameter string be enclosed in quotes (“”).

Command Line Parameters:

PVR=C:\EMS Program Files\	
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the PAVEMENT.MDB
IDIR=C:\EMS Program Files\PCIVideo	Directory containing the ASCII text files
INSP=PCIVInspection.txt	File containing Inspection information
SAMP=PCIVSample.txt	File containing Sample information
FRAM=PCIVFrame.txt	File containing Frame information
DIST=PCIVDistress.txt	File containing Distress information
COND=PCIVCondition.txt	File containing Condition information
OPTN=PCIVOptions.txt	File containing PCIVideo options
INTERACTIVE	If present, force display of UI

PCIVdb2PVR.exe

User interface for the use of Distress Data collected into an pre-configured Access database. It is recommended that the complete parameter string be enclosed in quotes (“”).

Command Line Parameters:

PVR=C:\EMS Program Files\	
PDIR=C:\EMS Program Files\User Data\Sample\	Directory containing the PAVEMENT.MDB
IDIR=C:\EMS Program Files\PCIVideo	Directory containing PCIVIntermediateFile.mdb
INTERACTIVE	If present, force display of UI

Six text files are needed to perform an import of video inspection data.

The following file formats support the import of collected frame distress data:

- Fields are separated by commas
- Strings are enclosed by quotes
- Dates are enclosed by pound signs
- Network, Branch, and Section are separated by 2 colons
- Optional fields may be blank but present

PCIVideoOptions.txt

```
 Line 1:
FieldA,FieldB,FieldC
“Metric”,”Data collected in contract #xxx”,”PID”

Line 2..n: (Optional)
Spacer:00000
DEFAULTFRAMESIZE:260
DEFAULTFRAMEUNITS:SQF
```

Where:

Line 1:

FieldA

Data values were collected in “English” or “metric”

FieldB

Comment to associate with the execution of this process

FieldC

Method of data association (UniqueId / PID / SID)

PCIVideoInspection.txt

```
 FieldA,FieldB,FieldC,FieldD,FieldE
“RSPARK::IFARB::01”,#6/5/2000#,”optional”,4,”optional”
```

Where:

FieldA

The identifier of the section which “owns” this inspection
NETWORKID::BRANCHID::SECTIONID
SPACER

FieldB

Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

FieldC

Usually some observations resulting from inspection

FieldD

How many samples in the inspection

FieldE

Indicates the origin of the inspection data

PCIVideoSample.txt

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG
"RSPARK::IFARB::01",#6/5/2000#,"1SMP2","R",52.95,"SqM","Sample Comment"
```

Where:

FieldA

The identifier of the section which "owns" this inspection
NETWORKID::BRANCHID::SECTIONID
SPACER

FieldB

Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

FieldC

Assigned by video vendor for this video sample (must be unique within section and inspection date)

FieldD

Type of Sample - "R" for Random and "A" for Additional

FieldE

Size of Sample

FieldF

Unit of measure (as defined in PAVER™) for the Sample Size

FieldG

Survey or Detail Comment regarding Sample

PCIVideoFrame.txt

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH,FieldI,FieldJ
"RSPARK::IFARB::01",#6/5/2000#,"1FRM2","",52.95,"SqM","START","END","LATITUTE","LONGITUDE"
```

Where:

FieldA

The identifier of the section which "owns" this inspection
NETWORKID::BRANCHID::SECTIONID
SPACER

FieldB

Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

FieldC

Assigned by video vendor Identifier for this video frame (must be unique within section and inspection date)

FieldD

Identifies this sample (optional)

FieldE

Size of frame

FieldF

Unit of measure (as defined in PAVER™) for the frame size

FieldG

Distance from start of film to begining of inspection frame (optional)

FieldH

Distance from start of film to end of inspection frame (optional)

FieldI

LATITUTE-GPS String of Degree, Minutes, Seconds (optional)

FieldJ

LONGITUDE -GPS String of Degree, Minutes, Seconds (optional)

PCIVideoDistress.txt

```
FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH,FieldI,FieldJ
"RSPARK::IFARB::01",#6/5/2000#,"","1FRM2", 7 ,"H", 1.46304001808166 ,"M","EDGE CRACKING"
```

Where:

FieldA

The identifier of the section which "owns" this inspection
NETWORKID::BRANCHID::SECTIONID
SPACER

FieldB

Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

FieldC

Sample number which owns this distress (if any)

FieldD

Assigned by video vendorIdentifier for this video frame (must be unique within section and inspection date)

FieldE

The distress code as used in PAVER™ (integer)

FieldF

H, M, L (if severity is used for the given distess code)

FieldG

The quantity of the distress (for distress numbers with quantity defined)

FieldH

Unit of measure (as defined in PAVER™) for the quantity

FieldI

Available for any comment/observation by the data collector (optional)

PCIVideoCondition.txt

```
 FieldA,FieldB,FieldC,FieldD,FieldE,FieldF,FieldG,FieldH
"RSPARK::IFARB::01",#6/5/2000#,"","", 21 ,"","IRI","Automated data collection"
```

Where:

FieldA

The identifier of the section which "owns" this inspection
NETWORKID::BRANCHID::SECTIONID
SPACER

FieldB

Identifies the date common to all data from this inspection (multi-day inspections just pick a day)

FieldC

Sample number which owns this distress (if any)

FieldD

Assigned by video vendorIdentifier for this video frame (must be unique within section and inspection date)

FieldE

The Numeric Condition value to be recorded

Only populate FieldE or FieldF as determined by the data type for the Condition Method

FieldF

The Textural Condition value to be recorded.

FieldG

The Condition Method (IRI / PCI / PCIV / etc.)

FieldH

Source of the condition value. (optional)

Units Of Measure Valid For PCIVideo

UNIT	System
F	English
FT	English
LF	English
SF	English
SQF	English
SQFT	English
M	Metric
SM	Metric
SQM	Metric
COUNT	Metric or English
SLAB	Metric or English
SLABS	Metric or English

Video Inspection Import Data Format (Access Database)

There are five data tables that can be created in Microsoft Access to input data. They include the following:

- PCIVideoDistress
- PCIVideoCondition
- PCIVideoInspection
- PCIVideoSample
- PCIVideoFrame

At least one of the two tables in bold type are required. Optional tables can be used to record additional descriptive data, if available. In general, data values that have been filled in are required, and those listed as optional can be omitted.

Appendix C

Abbreviations Of Surface Types 146

Abbreviations Of Surface Types

Abbreviation	Complete Name	Distress Manual Reference
AAC	Asphalt overlay over asphalt concrete	Asphalt
ABR	Asphalt over brick	Asphalt
AC	Asphalt concrete	Asphalt
ACT	Asphalt over cement treated base	Asphalt
APC	Asphalt overlay over Portland cement concrete	Asphalt
APZ	Asphalt over pozzolanic base	Asphalt
BR	Brick	Asphalt
COB	Cobblestone	Asphalt
GR	Gravel	Unsurfaced
PCC	Portland cement concrete	Concrete
PVB	Paving blocks	Asphalt
ST	Surface treatment	Asphalt
X	Other	Asphalt

Appendix D

Pavement Data Exchange (PDE) Format 148

Pavement Data Exchange (PDE) Format

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	SITE			SITE.DBF (Database and Contact Information)
Field	AGENCY	Text	61	PAVER™ Agency responsible for data maintenance
Field	SECUR	Text	25	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNIT	Text	7	Data units in “ENGLISH” or “METRIC”
Field	NAME	Text	25	PAVER™ Data Coordinator Name
Field	ADDR	Text	52	PAVER™ Data Coordinator Address
Field	CTYSTA	Text	30	PAVER™ Data Coordinator City and State
Field	ZIPCDE	Text	10	PAVER™ Data Coordinator Zip Code
Field	PHONE	Text	21	PAVER™ Data Coordinator Phone Number
Field	PASSWRD	Text	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	AGENCYID	Text	5	PAVER™ Agency Id
Table	FAMILY			FAMILY.DBF (Family Models)
Field	FAMILY	Text	20	Model name.
Field	MAXAGE	Number (Double)	8	Max age to be used for model.
Field	COEFF1	Number (Double)	8	Model 1st coefficient.
Field	COEFF2	Number (Double)	8	Model 2nd coefficient.
Field	COEFF3	Number (Double)	8	Model 3rd coefficient.
Field	COEFF4	Number (Double)	8	Model 4th coefficient.
Table	POLICY1			POLICY1.DBF (Maintenance Policy Names)
Field	POLICY	Number (Double)	8	Maintenance policy Id
Field	DESCRIPT	Text	30	Description of maintenance policy
Table	POLICY2			POLICY2.DBF (Maintenance Policy Details)
Field	POLICY	Number (Double)	8	Maintenance policy Id
Field	DISTRESS	Number (Double)	8	Distress for policy consideration
Field	SEVERITY	Text	1	Distress severity for policy consideration
Field	WORKTYPE	Text	5	Work type considered for distress and severity
Field	MATERIAL	Number (Double)	8	Material type considered for distress and severity
Field	EXTRA1	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	EXTRA2	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	UNITCOST	Number (Double)	8	Cost per work type unit
Table	NETWORK			NETWORK.DBF (Pavement Network Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	NAME	Text	61	Description of pavement network.
Field	NSORT1	Text	10	Supplemental value for selecting networks
Field	NSORT2	Text	10	Supplemental value for selecting networks
Field	NSORT3	Text	10	Supplemental value for selecting networks

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	BRANCH			BRANCH.DBF (Pavement Branch Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	NAME	Text	25	Description of pavement branch.
Field	USE	Text	10	Branch use. ROADWAY, APRON, RUNWAY, TAXIWAY, Etc.
Field	SECTIONS	Number (Double)	8	Number of pavement sections in the branch.
Field	AREA	Number (Double)	8	Total area of all sections in the branch.
Field	COMMENTS	Text	70	Any additional comments about the branch.
Field	BSORT1	Text	10	Supplemental value for selecting branches
Field	BSORT2	Text	10	Supplemental value for selecting branches
Field	BSORT3	Text	10	Supplemental value for selecting branches
Table	SECTION			SECTION.DBF (Pavement Section Inventory)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	FROM	Text	25	Starting location of pavement section
Field	TOO	Text	25	Ending location of pavement section
Field	ZONE	Text	4	User specified indicator for funding sources, maintenance areas, etc.
Field	CATEGORY	Text	1	Section category (A-Z, 0-9)
Field	RANK	Text	1	Pavement rank (A=Principal, B=Arterial, C=Collector, D=Industrial, E=Residential, N=Not Applicable, P=Primary, S=Secondary, T=Tertiary, X=Other)
Field	SURFACE	Text	10	Surface type (AAC, ABR, AC, ACT, APC, APZ, BR, COB, GR, PCC, PVB, ST, X)
Field	SECLEN	Number (Double)	8	Section Length
Field	SECWID	Number (Double)	8	Section Width
Field	SECAREA	Number (Double)	8	Section Area
Field	SLABLEN	Number (Double)	8	Slab length
Field	SLABWID	Number (Double)	8	Slab width
Field	NUMSLAB	Number (Double)	8	Number of slabs
Field	JOINTLEN	Number (Double)	8	Slab joint length
Field	LCD	Date/Time	8	Last construction date
Field	LID	Date/Time	8	Last inspection date
Field	LPCI	Number (Double)	8	Last inspection PCI condition
Field	FAMILY	Text	8	Family model assigned to section
Field	SHOULDER	Text	3	Shoulder type
Field	STRTYPE	Text	3	Street type
Field	GRADE	Number (Double)	8	Pavement grade in degrees
Field	LANES	Number (Double)	8	Number of lanes in section
Field	SSORT1	Text	10	Supplemental value for selecting sections
Field	SSORT2	Text	10	Supplemental value for selecting sections
Field	SSORT3	Text	10	Supplemental value for selecting sections

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	SAMPLE			SAMLE.DBF (Inspection Sample Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	SAMPLE	Text	10	Sample Id
Field	TYPE	Text	1	Sample type R=Random A=Additional
Field	SIZE	Number (Double)	8	Sample size, area or slabs
Field	PCI	Number (Double)	8	Sample PCI Condition
Field	DISTRESS	Number (Double)	8	Distress code
Field	SEVERITY	Text	1	Distress severity
Field	QTY	Number (Double)	8	Quantity of distress
Table	XDIST			XDIST.DBF (Inspection Extrapolated Distress Information)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	DISTRESS	Number (Double)	8	Distress code
Field	SEVERITY	Text	1	Distress severity
Field	QTY	Number (Double)	8	Quantity of distress
Field	DENSITY	Number (Double)	8	Density of distress for severity
Field	DEDUCT	Number (Double)	8	PCI points to deduct for this distress for severity
Table	CONDHIST			CONDHIST.DBF (Inspection Summary Results)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	INSDAT	Date/Time	8	Date of inspection.
Field	RIDE	Text	3	Condition rating: Ride Quality
Field	SAFETY	Text	3	Condition rating: Safety
Field	DRAIN	Text	3	Condition rating: Drainage Condition
Field	SHOULDER	Text	3	Condition rating: Shoulder Quality
Field	OVERALL	Text	3	Condition rating: Overall Condition
Field	FOD	Text	3	Condition rating: Foreign Object Damage
Field	SAMPLES	Number (Double)	8	Samples in section
Field	SAMPLE	Number (Double)	8	Samples in section
Field	PCI	Number (Double)	8	Condition rating: PCI
Field	RANDOM	Number (Double)	8	Random samples in section
Field	ADDITION	Number (Double)	8	Additional samples in section
Field	MINSAM	Number (Double)	8	Minimum number of samples recommended for section
Field	PCISTA	Number (Double)	8	*INTERNAL USE* *VALUE NOT REQUIRED*
Field	LOAD	Number (Double)	8	Percent of distress due to: LOAD
Field	CLIMATE	Number (Double)	8	Percent of distress due to: CLIMATE
Field	OTHER	Number (Double)	8	Percent of distress due to: OTHER

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	TRAFFIC			TRAFFIC.DBF (Traffic survey Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	SURVEY	Date/Time	8	Starting date of traffic survey
Field	AIRTYPE	Text	15	(Airfields) Aircraft model
Field	ANNDEP	Number (Double)	8	(Airfields) Annual number of departures
Field	AVDAILY	Number (Double)	8	(Airfields) Average number of daily departures
Field	PERDESGN	Number (Double)	8	(Roadways) Percent of traffic in design lane
Field	PER2AT	Number (Double)	8	(Roadways) Percent of twin axle trucks in design lane
Field	PER3AT	Number (Double)	8	(Roadways) Percent of trucks with 3 or more axles in design lane
Field	ESAL	Number (Double)	8	(Roadways) Annual ESAL in design lane
Field	COMMENT	Text	70	Comments related to traffic survey
Field	ENDDATE	Date/Time	8	Ending date of traffic survey
Table	MATPRO			MATPRO.DBF (Layer and Materials Testing Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LAYER	Text	10	Layer type: OVERLAY, SURFACE, BASE, SUBBASE, SUBGRADE
Field	TESTTYPE	Text	50	Test type
Field	TESTDATE	Date/Time	8	Date of test
Field	TESTLOC	Text	10	Location of test
Field	TESTVAL	Text	10	Result value of test
Field	DEPTH	Number (Double)	8	Depth from layer surface
Field	COMMENT	Text	70	Comments related to Material Test
Table	WORREQ			WORKREQ.DBF (Pavement Work Required Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5	Work type code
Field	STADATE	Date/Time	8	Date to start project
Field	IDDATE	Date/Time	8	Proposed date to start project
Field	PROPOSAL	Text	12	Proposal Id
Field	PHASE	Text	2	Project phase
Field	ACCOMP	Text	1	Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8	Quantity of work type to be performed
Field	COST	Number (Double)	8	Cost based on work type and quantity
Field	MATERIAL	Number (Double)	8	Material type used for work type
Field	THICK	Number (Double)	8	Thickness of material
Field	COMMENT	Text	70	Comments related to project

OBJECT	NAME	DATA TYPE	DATA SIZE	USAGE
Table	WORKHIST			WORKHIST.DBF (Pavement Work History Details)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	WORKTYPE	Text	5	Work type code
Field	COMPLETE	Date/Time	8	Date work completed
Field	MATERIAL	Number (Double)	8	Material type used for work type
Field	THICK	Number (Double)	8	Thickness of material
Field	ACCOMP	Text	1	Manner Accomplished I=Inhouse C=Contractor
Field	QTY	Number (Double)	8	Quantity of work type to be performed
Field	COST	Number (Double)	8	Cost based on work type and quantity
Field	COMMENT	Text	70	Comments related to project
Field	STADATE	Date/Time	8	Date project started
Field	IDDATE	Date/Time	8	Proposed date to start project
Field	PROPOSAL	Text	12	Proposal Id
Field	PHASE	Text	2	Project phase
Table	NDT1			NDT1.DBF (FWD Testing Summary)(Not imported into PAVER™ 4.0)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8	Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8	Station number tested
Field	TESTDATE	Date/Time	8	Date of testing
Field	TEMP	Number (Double)	8	Air temperature
Field	LOAD	Number (Double)	8	Test load in kilograms
Field	MAXDEF	Number (Double)	8	Maximum deflection in mils
Field	TRANSFER	Number (Double)	8	Load transfer in percent
Field	TESTTYPE	Text	1	NDT type: D=Design, A=Average
Table	NDT2			NDT2.DBF (FWD Testing Detail)(Not imported into PAVER™ 4.0)
Field	NETWORK	Text	10	Large group of pavements. Usually Airport, City, Sub-Division Identifier
Field	BRANCH	Text	10	Medium grouping of pavements. Usually runway, taxiway, apron, street name.
Field	SECTION	Text	10	Area of same pavement type. This is the unit of pavement used for inspection rating methods.
Field	LOCATION	Number (Double)	8	Area tested. (Center, Wheel Path, Edge Loading, Corner, Etc.)
Field	STATION	Number (Double)	8	Station number tested
Field	TESTDATE	Date/Time	8	Date of testing
Field	TEMP	Number (Double)	8	Air temperature
Field	LOAD	Number (Double)	8	Test load in kilograms
Field	SENSOR	Number (Double)	8	Sensor measured
Field	DISTANCE	Number (Double)	8	Sensor distance from load
Field	DEFLECT	Number (Double)	8	Sensor deflection in mils

Appendix E

Example Pavement Survey Forms 154
Asphalt Surfaced Roads And Parking Lots 156
Airfield Concrete Pavement 157
Airfield Asphalt Pavement 158
Unsurfaced Roads 159
Deduct Values 160

Example Pavement Survey Forms

Included on the following pages are some example forms for surveying asphalt and concrete pavements. The six example forms are:

- Concrete Surfaced Roads and Parking Lots
- Asphalt Surfaced Roads and Parking Lots
- Airfield Concrete Pavement
- Airfield Asphalt Pavement
- Unsurfaced Roads
- Deduct Values

PCC ROADWAY PAVEMENT CONDITION SURVEY DATA SHEET

PID		INSPECTOR NAME	
FROM		BRANCH USE	DATE INSPECTED
TO		SECTION WIDTH	SECTION LENGTH
SLAB WIDTH	SLAB LENGTH	NUMBER OF SLABS	

PCC Surfaced Distress Codes

21. Blowup/ Buckling	26. Joint Seal Damage	31. Polished Aggregate	36. Scaling, Cracking, Crazing
22. Corner Break	27. Lane/ Shoulder Drop	32. Popouts	37. Shrinkage
23. Divided Slab	28. Linear Cracking	33. Pumping	38. Spalling, Corner
24. Durability Crack	29. Patching, Large	34. Punchout	39. Spalling, Joint
25. Faulting	30. Patching, Small	35. Railroad Crossing	

SAMPLE NUMBER	SLABS IN SAMPLE		
DISTRESS CODE	L	M	H

Sketch / Comments

SAMPLE NUMBER	SLABS IN SAMPLE		
DISTRESS CODE	L	M	H

SAMPLE NUMBER	SLABS IN SAMPLE		
DISTRESS CODE	L	M	H

AC ROADWAY PAVEMENT CONDITION SURVEY DATA SHEET

PID	INSPECTOR NAME	
FROM	BRANCH USE	DATE INSPECTED
TO	SECTION WIDTH	SECTION LENGTH

AC Surfaced Distress Codes

1. Alligator Cracking	6. Depression	11. Patching & Utility Cut Patching	16. Shoving
2. Bleeding	7. Edge Cracking	12. Polished Aggregate	17. Slippage Cracking
3. Block Cracking	8. Joint Reflection Cracking	13. Potholes	18. Swell
4. Bumps And Sags	9. Lane/ Shoulder Drop-Off	14. Railroad Crossing	19. Raveling
5. Corrugation	10. Long & Trans Cracking	15. Rutting	20. Weathering

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

Sketch / Comments

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

PCC AIRFIELD PAVEMENT CONDITION SURVEY DATA SHEET

PID		INSPECTOR NAME	
FROM		BRANCH USE	DATE INSPECTED
TO		SECTION WIDTH	SECTION LENGTH
SLAB WIDTH	SLAB LENGTH	NUMBER OF SLABS	

PCC Surfaced Distress Codes

61. Blowup	65. Joint Seal Damage	69. Pumping	73. Shrinkage Cracks
62. Corner Break	66. Patching, Small	70. Scaling	74. Spalling, Joints
63. Cracks	67. Patching, Large	71. Settlement/ Faulting	75. Spalling, Corner
64. Durability Cracking	68. Popouts	72. Shattered Slab	76. ASR

SAMPLE NUMBER		SLABS IN SAMPLE		Sketch / Comments
DISTRESS CODE	L	M	H	

SAMPLE NUMBER		SLABS IN SAMPLE		Sketch / Comments
DISTRESS CODE	L	M	H	

AC AIRFIELD PAVEMENT CONDITION SURVEY DATA SHEET

PID	INSPECTOR NAME	
FROM	BRANCH USE	DATE INSPECTED
TO	SECTION WIDTH	SECTION LENGTH

AC Surfaced Distress Codes

41. Alligator Cracking	46. Jet Blast	51. Polished Aggregate	56. Swell
42. Bleeding	47. Jt. Reflection (PCC)	52. Raveling	57. Weathering
43. Block Cracking	48. Long. & Trans. Cracking	53. Rutting	
44. Corrugation	49. Oil Spillage	54. Shoving From PCC	
45. Depression	50. Patching	55. Slippage Cracking	

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

Sketch / Comments

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

UNSURFACED ROADS CONDITION SURVEY DATA SHEET

PID	INSPECTOR NAME	
FROM	BRANCH USE	DATE INSPECTED
TO	SECTION WIDTH	SECTION LENGTH

Unsurfaced Distress Codes

81. Improper Cross Section Linear Ft
82. Inadequate Roadside Drainage Sq Ft
83. Corrugations Sq Ft
84. Dust
85. Potholes Count
86. Ruts Sq Ft
87. Loose Aggregate Linear Ft

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

Sketch / Comments

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

SAMPLE NUMBER		SAMPLE AREA	
DISTRESS CODE	L	M	H

Deduct Values

No.	DEDUCT VALUES												TOTAL	q	CDV
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

Appendix F

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Unsurfaced Roads 165

Load & Climate Distresses

Asphalt Surfaced Roads And Parking Lots

Pavement Distress	Distress Type
1. Alligator Cracking	Load
2. Bleeding	Other
3. Block Cracking	Climate/Durability
4. Bumps & Sags	Other
5. Corrugation	Other
6. Depression	Other
7. Edge Cracking	Load
8. Joint Reflection Cracking	Climate/Durability
9. Lane/Shoulder Drop Off	Other
10. Longitudinal/Transverse Cracking	Climate/Durability
11. Patch/Utility Cut	Other
12. Polished Aggregate	Other
13. Pothole	Load
14. Railroad Crossing	Other
15. Rutting	Load
16. Shoving	Other
17. Slippage Cracking	Other
18. Swell	Other
19. Raveling	Climate/Durability
20. Weathering	Climate/Durability

Concrete Surfaced Roads And Parking Lots

Pavement Distress	Distress Type
21. Blow Up	Climate/Durability
22. Corner Break	Load
23. Divided Slab	Load
24. Durability Cracking	Climate/Durability
25. Faulting	Other
26. Joint Seal Damage	Climate/Durability
27. Lane/Shoulder Drop Off	Other
28. Linear Cracking	Load
29. Large Patch/Utility Cut	Other
30. Small Patch	Other
31. Polished Aggregate	Other
32. Popouts	Other
33. Pumping	Other
34. Punchout	Load
35. Railroad Crossing	Other
36. Scaling	Other
37. Shrinkage Cracking	Climate/Durability
38. Corner Spalling	Climate/Durability
39. Joint Spalling	Climate/Durability

Pavement Distress	Distress Type
41. Alligator Cracking	Load
42. Bleeding	Other
43. Block Cracking	Climate/Durability
44. Corrugation	Other
45. Depression	Other
46. Jet Blast	Other
47. Joint Reflection Cracking	Climate/Durability
48. Longitudinal/Transverse Cracking	Climate/Durability
49. Oil Spillage	Other
50. Patching	Climate/Durability
51. Polished Aggregate	Other
52. Raveling	Climate/Durability
53. Rutting	Load
54. Shoving	Other
55. Slippage Cracking	Other
56. Swell	Other
57. Weathering	Climate/Durability

Concrete Surfaced Airfields

Pavement Distress	Distress Type
61. Blow Up	Climate/Durability
62. Corner Break	Load
63. Linear Cracking	Load
64. Durability Cracking	Climate/Durability
65. Joint Seal Damage	Climate/Durability
66. Small Patch	Other
67. Large Patch/Utility Cut	Other
68. Popouts	Other
69. Pumping	Other
70. Scaling	Other
71. Faulting	Other
72. Shattered Slab	Load
73. Shrinkage Cracking	Other
74. Joint Spalling	Other
75. Corner Spalling	Other
76. Alkili Silica Reaction (ASR)	Other

Unsurfaced Roads

Pavement Distress	Distress Type
81. Improper Cross Section	Other
82. Inadequate Roadside Drainage	Other
83. Corrugation	Climate/Durability
84. Dust	Other
85. Pothole	Climate/Durability
86. Rutting	Climate/Durability
87. Loose Aggregate	Other

Appendix G

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PAVER™ Network Installation

PAVER™ 5 is not a networked application; it is designed for use on a single workstation. If you must install the system in a networked environment, there are only two meaningful alternatives:

Network The Pavement Databases And Restrict Editing

Install PAVER™ on each networked workstation that will have access to the networked pavement databases. Put the shared pavement databases on the network server, and map a drive on each workstation to provide access to the networked database. Each user can then access the shared pavement database using File/Open from the main PAVER™ desktop menu.

With this approach, each workstation has its own copy of system tables but is accessing a shared pavement database. This creates two potential problems which must be resolved by careful management:

1. Since PAVER™ does not support multi-user access, conflicts could arise if different users are editing the pavement data at the same time. For this reason, you must establish a process whereby editing the pavement data (entering inventory, inspections and work) is restricted to one of the networked workstations. This will preclude multiple simultaneous edits.

2. Since this configuration creates multiple copies of the system tables, different workstations could produce different results for the same pavement data based on different system table usage. For this reason, you must establish a process whereby edits to the system tables are manually propagated (via import/export) to the other workstations.

With these two restrictions, users on the network can access a networked pavement database.

Use A Terminal Services Or Citrix Server

You can install PAVER™ on a Terminal Services or Citrix server and allow users to access the common PAVER™ install. However, since PAVER™ does not support multiple user access to common data, you must enforce rules like those above:

1. Two users cannot edit the same pavement data at the same time. You can configure your server so that different users can only see different pavement databases, or you must enforce by process that only one user is allowed to edit the pavement data.

2. Two users cannot edit the system tables at the same time. Here you have no configuration option; you must enforce a process that only one user is able to edit system table data.

With these two restrictions, users can access a common PAVER™ install on the Terminal Services/ Citrix server.

Another alternative is to have multiple PAVER™ installs on the server, and give each user their own system tables and pavement data. In this case, there need be no process restrictions because you are giving each user their own databases.

Appendix H

Computing Work Quantity From Distress Quantity.....169

Computing Work Quantity From Distress Quantity

1. We look in the "Work Conversion By Work Type" table given below. If the work type is there (which is currently only true for Slab Replacement – PCC), we say the work quantity is equal to the slab area.

Work Name	Conversion Type	Multiplier
Slab Replacement – PCC	Slab Area	1

2. If there is no conversion by work type, we try to look up the conversion by distress type, severity, and work unit type in the table given below. If a matching record is found, we take the amount given by the conversion type column (e.g., for distress 21, we use slab width) and multiply it by the distress quantity and the value in the multiplier column to get the work quantity. The conversion type definitions are:

- Slab Width: Work quantity = distress quantity x slab width x multiplier
- Slab Length: Work quantity = distress quantity x slab length x multiplier
- Slab Area: Work quantity = (slab width x slab length) x distress quantity x multiplier.
- Constant: Work quantity = distress quantity x multiplier
- Joint Calculation: Work quantity = joint length x (distress quantity/number of slabs) x multiplier
- Distress Area: Work quantity = distress area x multiplier
- Slab Length + Width : Work quantity = (slab width + slab length) x distress quantity x multiplier
- Patch Area: Work quantity = distress quantity + (0.6096 x squareroot(distress quantity/multiplier) x (multiplier + 1)) + 0.3716

Otherwise, work quantity = distress quantity x multiplier

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
1	Alligator Cracking	Any	Any	Patch Area	1.25
2	Bleeding	Any	Any	Distress Quantity	1
3	Block Cracking	Any	Any	Distress Quantity	1
4	Bumps/ Sags	Any	Any	Distress Quantity	1
5	Corrugation	Any	Any	Patch Area	1.25
6	Depression	Any	Any	Patch Area	1.25
7	Edge Cracking	Any	Area	Distress Quantity	0.5
7	Edge Cracking	Any	Linear	Distress Quantity	1
8	Joint Reflection Cracking	Any	Area	Distress Quantity	0.5
8	Joint Reflection Cracking	Any	Linear	Distress Quantity	1
9	Lane/ Shoulder Drop	Any	Any	Distress Quantity	1
10	Longitudinal/ Transverse Cracking			Distress Quantity	1
11	Patch/ Utility Cut	Any	Any	Patch Area	1.25
12	Polished Aggregate	Any	Any	Distress Quantity	1
13	Pothole	H	Any	Constant	0.836
**Note: All units are in metric					

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
13	Pothole	M	Any	Constant	0.557
13	Pothole	L	Any	Constant	0.278
14	Railroad Crossing	Any	Any	Distress Quantity	1
15	Rutting	Any	Any	Distress Quantity	1
16	Shoving	Any	Any	Patch Area	1.25
17	Slippage Cracking	Any	Any	Patch Area	1.25
18	Swell	Any	Any	Patch Area	1.25
19	Raveling	Any	Any	Distress Quantity	1
20	Weathering	Any	Any	Distress Quantity	1
21	Blow-up/ Shatter	H	Linear	Slab Width	1
21	Blow-up/ Shatter	H	Area	Slab Width	2
21	Blow-up/ Shatter	L	Linear	Slab Width	1
21	Blow-up/ Shatter	L	Area	Slab Width	1
21	Blow-up/ Shatter	M	Linear	Slab Width	1
21	Blow-up/ Shatter	M	Area	Slab Width	1.5
22	Corner Break	L	Area	Constant	3
22	Corner Break	H	Area	Constant	3
22	Corner Break	L	Linear	Constant	2.5
22	Corner Break	H	Linear	Constant	2.5
22	Corner Break	M	Area	Constant	3
22	Corner Break	M	Linear	Constant	2.5
23	Divided Slab	Any	Linear	Slab Length + Width	1
23	Divided Slab	Any	Area	Slab Area	1
24	Durability Cracking	L	Linear	Slab Width	1
24	Durability Cracking	H	Area	Slab Area	1
24	Durability Cracking	L	Area	Slab Width	1
24	Durability Cracking	M	Linear	Slab Width	1
24	Durability Cracking	H	Linear	Slab Length + Width	1
24	Durability Cracking	M	Area	Slab Width	1.25
25	Faulting	Any	Any	Slab Width	1
26	Joint Seal Damage	Any	Area	Joint Calculation	0.304
26	Joint Seal Damage	Any	Linear	Joint Calculation	1
27	Lane/ Shoulder Drop	Any	Area	SlabLength	1
27	Lane/ Shoulder Drop	Any	Linear	Slab Length	1
28	Linear Cracking	Any	Linear	Slab Length + Width	0.5
28	Linear Cracking	Any	Area	Slab Area	1
29	Large Patch/ Utility Cut	Any	Area	Slab Width	1.5
29	Large Patch/ Utility Cut	Any	Linear	Slab Width	1
30	Small Patch	Any	Linear	Constant	0.5
**Note: All units are in metric					

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
30	Small Patch	Any	Area	Constant	0.25
31	Polished Aggregate	Any	Linear	Slab Length	1
31	Polished Aggregate	Any	Area	Slab Area	1
32	Popouts	Any	Linear	Slab Length	1
32	Popouts	Any	Area	Slab Area	1
33	Pumping	Any	Linear	Slab Width	1
33	Pumping	Any	Area	Slab Width	0.304
34	Punchout	Any	Area	Slab Width	1.5
34	Punchout	Any	Linear	Slab Width	1
35	Railroad Crossing	Any	Linear	Slab Width	1
35	Railroad Crossing	Any	Area	Slab Width	1.5
36	Scaling/ Crazing	M	Area	Slab Width	1.25
36	Scaling/ Crazing	M	Linear	Slab Width	1
36	Scaling/ Crazing	L	Linear	Slab Width	1
36	Scaling/ Crazing	L	Area	Slab Width	1.25
36	Scaling/ Crazing	H	Linear	Slab Length + Width	1
36	Scaling/ Crazing	H	Area	Slab Area	1.25
37	Shrinkage Cracking	Any	Linear	Constant	1.5
37	Shrinkage Cracking	Any	Area	Constant	0.305
38	Corner Spalling	Any	Area	Constant	0.25
38	Corner Spalling	Any	Linear	Constant	0.5
39	Joint Spalling	L	Linear	Constant	0.5
39	Joint Spalling	M	Area	Slab Width	0.5
39	Joint Spalling	H	Area	Slab Width	0.5
39	Joint Spalling	M	Linear	Slab Width	0.5
39	Joint Spalling	L	Area	Slab Width	0.25
39	Joint Spalling	H	Linear	Slab Width	1
41	Alligator Cracking	Any	Any	Patch Area	1.25
42	Bleeding	Any	Any	Distress Quantity	1
43	Block Cracking	Any	Any	Distress Quantity	1
44	Corrugation	Any	Any	Patch Area	1.25
45	Depression	Any	Any	Patch Area	1.25
46	Jet Blast	Any	Any	Distress Quantity	1
47	Joint Reflection Cracking	Any	Linear	Distress Quantity	1
47	Joint Reflection Cracking	Any	Area	Distress Quantity	0.5
48	Longitudinal/ Transverse Cracking	Any	Any	Distress Quantity	1
49	Oil Spillage	Any	Any	Patch Area	1.25
50	Patching	Any	Any	Patch Area	1.25
51	Polished Aggregate	Any	Any	Distress Quantity	1
**Note: All units are in metric					

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
52	Raveling	Any	Any	Distress Quantity	1
53	Rutting	Any	Any	Distress Quantity	1
54	Shoving	Any	Any	Patch Area	1.25
55	Slippage Cracking	Any	Any	Patch Area	1.25
56	Swelling	Any	Any	Patch Area	1.25
57	Weathering	Any	Any	Distress Quantity	1
61	Blow-up/ Shatter	L	Linear	Slab Width	1
61	Blow-up/ Shatter	H	Area	Slab Width	2
61	Blow-up/ Shatter	M	Area	Slab Width	1.5
61	Blow-up/ Shatter	H	Linear	Slab Width	1
61	Blow-up/ Shatter	M	Linear	Slab Width	1
61	Blow-up/ Shatter	L	Area	Slab Width	1
62	Corner Break	M	Linear	Constant	2.5
62	Corner Break	H	Area	Constant	3
62	Corner Break	M	Area	Constant	3
62	Corner Break	L	Area	Constant	3
62	Corner Break	L	Linear	Constant	2.5
62	Corner Break	H	Linear	Constant	2.5
63	Linear Cracking	Any	Any	Slab Length + Width	0.5
63	Linear Cracking	Any	Area (Slab Replacement)	Slab Area	1
64	Durability Cracking	H	Linear	Slab Length + Width	1
64	Durability Cracking	M	Area	Slab Width	1.25
64	Durability Cracking	M	Linear	Slab Width	1
64	Durability Cracking	L	Area	Slab Width	1
64	Durability Cracking	L	Linear	Slab Width	1
64	Durability Cracking	H	Area	Slab Area	1
65	Joint Seal Damage	Any	Area	Joint Calculation	0.304
65	Joint Seal Damage	Any	Linear	Joint Calculation	1
66	Small Patch	Any	Linear	Constant	0.5
66	Small Patch	Any	Area	Constant	0.25
67	Large Patch/ Utility Cut	Any	Linear	Slab Width	1
67	Large Patch/ Utility Cut	Any	Area	Slab Width	1.5
68	Popouts	Any	Area	Slab Area	1
68	Popouts	Any	Linear	Slab Length	1
69	Pumping	Any	Linear	Slab Width	1
69	Pumping	Any	Area	Slab Width	0.304
70	Scaling	L	Area	Slab Width	1.25
70	Scaling	H	Area	Slab Area	1.25
**Note: All units are in metric					

Distress Code	Description	Severity	Work Unit Type	Conversion Type	Multiplier
70	Scaling	H	Linear	Slab Length + Width	1
70	Scaling	M	Linear	Slab Width	1
70	Scaling	L	Linear	Slab Width	1
70	Scaling	M	Area	Slab Width	1.25
71	Faulting	Any	Any	Slab Width	1
72	Divided Slab	Any	Linear	Slab Length + Width	1
72	Divided Slab	Any	Area	Slab Area	1
73	Shrinkage Cracking	Any	Area	Constant	0.304
73	Shrinkage Cracking	Any	Linear	Constant	1.5
74	Joint Spalling	L	Linear	Constant	0.5
74	Joint Spalling	L	Area	Slab Width	0.25
74	Joint Spalling	M	Linear	Slab Width	0.5
74	Joint Spalling	M	Area	Slab Width	0.5
74	Joint Spalling	H	Linear	Slab Width	1
74	Joint Spalling	H	Area	Slab Width	0.5
75	Corner Spalling	Any	Linear	Constant	0.5
75	Corner Spalling	Any	Area	Constant	0.25
76	ASR	L	Area	Slab Width	1.25
76	ASR	H	Area	Slab Area	1.25
76	ASR	H	Linear	Slab Length + Width	1
76	ASR	M	Linear	Slab Width	1
76	ASR	L	Linear	Slab Width	1
76	ASR	M	Area	Slab Width	1.25
**Note: All units are in metric					

Glossary

Checkbox

A Microsoft Windows standard user interface item for indicating a user selection. Checkboxes are small square items that are displayed in an array for the user to make a selection(s) from. When the mouse is pointing to the checkbox and the left mouse button is clicked a check mark or 'X" will appear in the checkbox. Typically checkboxes are used when more than one option can be selected from a list.

Critical PCI

Defined as the PCI value at which the rate of PCI loss increases with time, or the cost of applying localized preventive maintenance increases significantly.

Drop-down Menu

A Microsoft Windows standard menu that is associated with a data entry form or grid. The drop-down menu contains a list of the available selections for a data entry field. The drop-down list is not visible until the field associated with the drop-down list is selected by the user. When the Field is selected the drop-down list is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a picklist or drop-down list.

EMS™ Picture Server

The EMS™ Picture Tool is an interface for storing images associated with a particular pavement database. Images can be associated with the a network, or assigned to individual branches and sections. It provides a convenient way to establish a pictorial record of database units.

EMS™ Query

A tool used to temporarily select a subset of pavement sections for analysis or reporting. The application of a query to the active database does not cause any records in the database to be changed or deleted. The query tool can also be used to specify the sort order of report results.

Family

A pavement "family" is defined as a group of pavement sections with similar deterioration characteristics. The family model is estimated from the plot of observed age and condition measurements for pavements with similar attributes.

Geographical Information System (GIS)

Geographical Information System (GIS) refers to a system that presents data in the context of a map. GIS can be used to display PAVER™ inventory, condition, distress, cost and other pavement data as color-coded maps.

Global Preventive Maintenance & Repair (M&R)

Defined as activities applied to entire pavement sections with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

Localized Preventive M&R

Defined as distress maintenance activities performed with the primary objective of slowing the rate of deterioration. This policy is applied to pavements above the critical PCI.

Localized Stopgap (Safety) Maintenance and Repair

Stopgap M&R is defined as the localized M&R needed to keep the pavement operational in a safe condition. This policy is applied to pavements below the critical PCI.

Major M&R

Activities applied to the entire pavement section to correct or improve existing structural or functional requirements. It is also used to upgrade pavements below the critical PCI.

Modal

A Microsoft Windows form for displaying or collecting information. A modal form must be configured and executed or closed before you can resume other PAVER™ or Windows tasks.

Parameter Collection Screen

A Microsoft Windows form that is used to configure the PAVER™ Condition Analysis, Work Plan and Inspection Schedule Reports. The parameter collection screens displays the default settings for the various report parameters that can be configured by the user. In general the values on the form can be adjusted to reflect the desired setting. The parameter collection screen is a modal screen.

Pavement Branch

A branch is a readily identifiable part of the pavement network and has a distinct function. For example, an individual street or a parking lot would each be considered a separate branch of the pavement network. Similarly, an airfield pavement such as a runway or a taxiway would each be considered a separate branch.

Pavement Condition Index (PCI)

The PCI is the default condition index for the PAVER™ system. A numerical index, ranging from 0 for a failed pavement to 100 for a pavement in perfect condition. Calculation of the PCI is based on the results of a visual condition survey in which distress type, severity, and quantity are identified. It was developed to provide an index of the pavement's structural integrity and surface operational condition.

Pavement Identification (PID)

Pavement Identification (PID) is the unique combination of pavement inventory information that makes a particular pavement section unique. The PID is formed from the network ID, branch ID and section ID.

Pavement Network

A logical unit for organizing pavements into a structure for the purpose of pavement management. A network will consist of one or more pavement branches, which in turn may consist of one or many pavement sections. The network is the point of origin for the hierarchy of pavement management structures.

Pavement Section

A section should be viewed as the smallest management unit when considering the application and selection of M&R treatments. It is a logical unit assigned to a stretch of pavement that exhibits a common age, construction type, traffic and other criteria. The terminus or leaf point in the hierarchy of defined pavement management structures. A pavement section will be defined as a subordinate of a pavement branch, which in turn will be a subordinate of a parent pavement network.

PAVER™ Button Bar

The array of eight buttons displayed across the top of the PAVER™ for Windows Desktop are used to invoke the most used PAVER™ for Windows features. Each button contains descriptive text and a graphic related to the function of the program the button launches.

Picklist

A Microsoft Windows standard menu associated with a data entry form or grid. The picklist menu contains a list of the available selections for a data entry field. The picklist is not visible until the field associated with the picklist is selected by the user. When the Field is selected the picklist is activated by clicking the small down arrow located in the far right portion of the field mask. Alternately referred to as a drop menu or drop list.

Polygon Attribute Table (PAT)

A Polygon Attribute Table (PAT) is a list used by a Geographical Information System (GIS) to relate database information (such as PAVER™ PCI values) to a GIS map location. In PAVERGIS the PAT is used to describe the sections in a PAVER™ database. Polygons are used in GIS to represent PAVER™ features (roads, parking lots, runways, aprons, etc) and then tabular data is attached to the features. A coverage is defined by several files. Some of the files contain graphical information, while others contain table information.

Radio Button

A Microsoft Windows standard user interface item for indicating a user selection. Radio buttons are small circular items that typically displayed in array for the user to make a mutually exclusive selection from.

Report Viewer

A standard interface which presents results as spreadsheet tables with associated graphs. The Condition Analysis Report, M&R Planning Report, and the Inspection Scheduling Report all present their results in the EMS™ Report Viewer format.

Right-button Click Feature

Added capabilities available for an object, either a PAVER™ spreadsheet table or a graph that are accessed by pointing to the object with the mouse and clicking the right mouse button.

Structured Query Language (SQL)

A standard database access language (collection of commands, control clauses, etc) supported by all major database managers. Structured Query Language, or SQL, provides a standard way to get or view information from a database, or put information into a database.

Tab Table Data

The common PAVER™ for Windows data that is edited on Tab Table forms. Tab Table data includes the PAVER™ User-defined Fields tables, Inventory picklists, Work Plan tables, Materials, and Misc. Other Tables.

Tab Table Form

Microsoft standard form for editing and reviewing data. The Tab Table form simulates index cards that can be selected by pointing to the index tab portion of the card with the mouse and pressing the left mouse button.

User-defined Fields

Discretionary inventory information that can be added to the existing attributes for networks, branches, and sections. A total of nine user-defined fields are available, three for each inventory item.

View Menu

An item on the PAVER™ Menu, that is active only when the Report Viewer is the active window. The View Menu lists the available tables. Open tables have a check mark to the left of the menu item.

Virtual Inventory

The virtual inventory option allows the user to make copies of existing inventories, and to combine sections according to some criteria to create a virtual section. For example, a virtual inventory can be created in which all taxiway sections of the original inventory are combined, creating a virtual "taxiway" section. Conditions can then be calculated, as well as reports formulated, for the virtual section.

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Workshop 1: Network Definition

Objective

Section a network into manageable branches and sections.

Database

Use the maps on the following pages.

Tasks

1. Section the pavement network(s) into named branches and sections.

Hints & Solution Guide For Workshop 1

1. Section the network: Use the following guidelines when performing the sectioning.

   - There is no specific correct answer to network definition, rather the solution is a function of pavement attributes, traffic, and management practices.
   - Be consistent, and use terminology common to all of the users of the system.
   - Use facility names or numbers for branches (i.e. Runway 12-30).
   - A Branch should have a unique functional use (i.e. runway, taxiway, roadway, etc.).
   - A Section should have a unique surface type, rank, and last construction date.
   - Use common sense when naming. The names should be easy to understand by all of the system users including maintenance personnel and contractors.

Sample Unit Distresses

Agency Name: Base Name
City

Network ID:

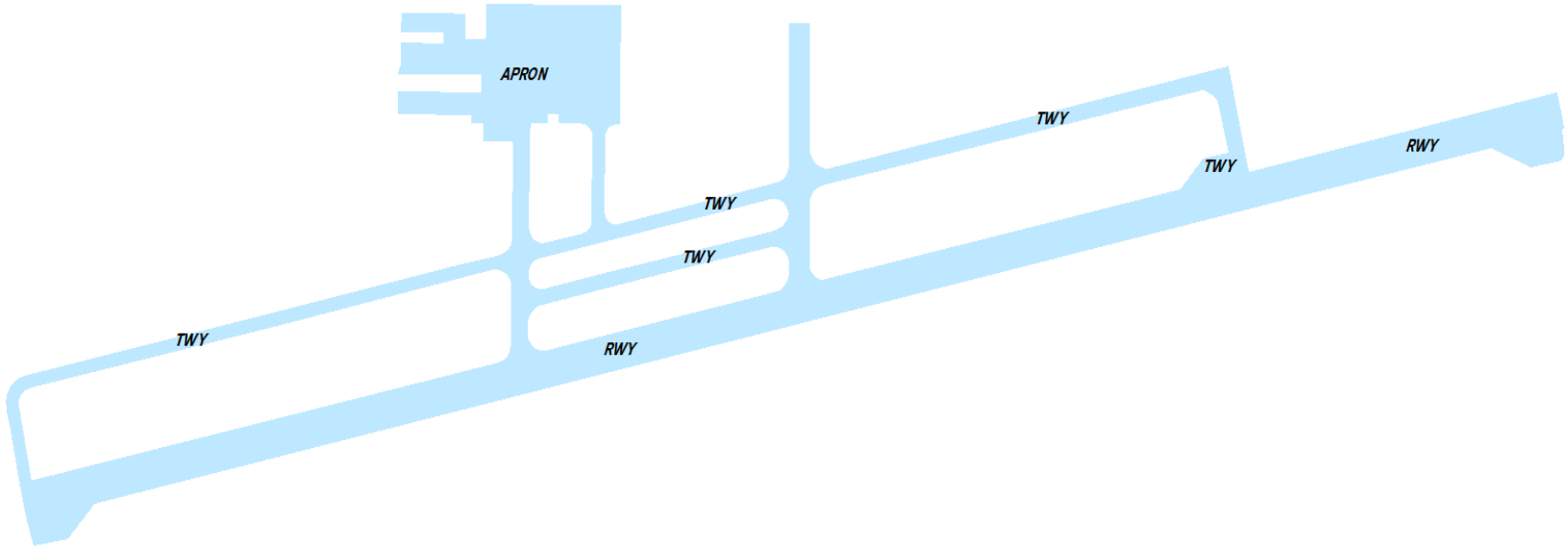
AC Airfield Distresses:

41. Alligator Cracking
42. Bleeding
43. Block Cracking
44. Corrugation
45. Depression
46. Jet Blast
47. Joint Reflection
48. Long. Cracking
49. Oil Spillage
50. Patching
51. Polished Aggregate
52. Raveling
53. Rutting
54. Shoving From PCC
55. Slippage Cracking
56. Swell
57. Weathering

PCC Airfield Distresses:

61. Blowup
62. Corner Break
63. Cracks
64. Durability Cracking
65. Joint Seal Damage
66. Patching, Small
67. Patching, Large
68. Popouts
69. Pumping
70. Scaling
71. Settlement
72. Shattered Slab
73. Shrinkage Cracks
74. Spalling, Joints
75. Spalling, Corner
76. ASR

Note: All pavement is asphalt except the apron, which is concrete



Sample Unit Distresses

Agency Name: Base Name
City

Network ID:

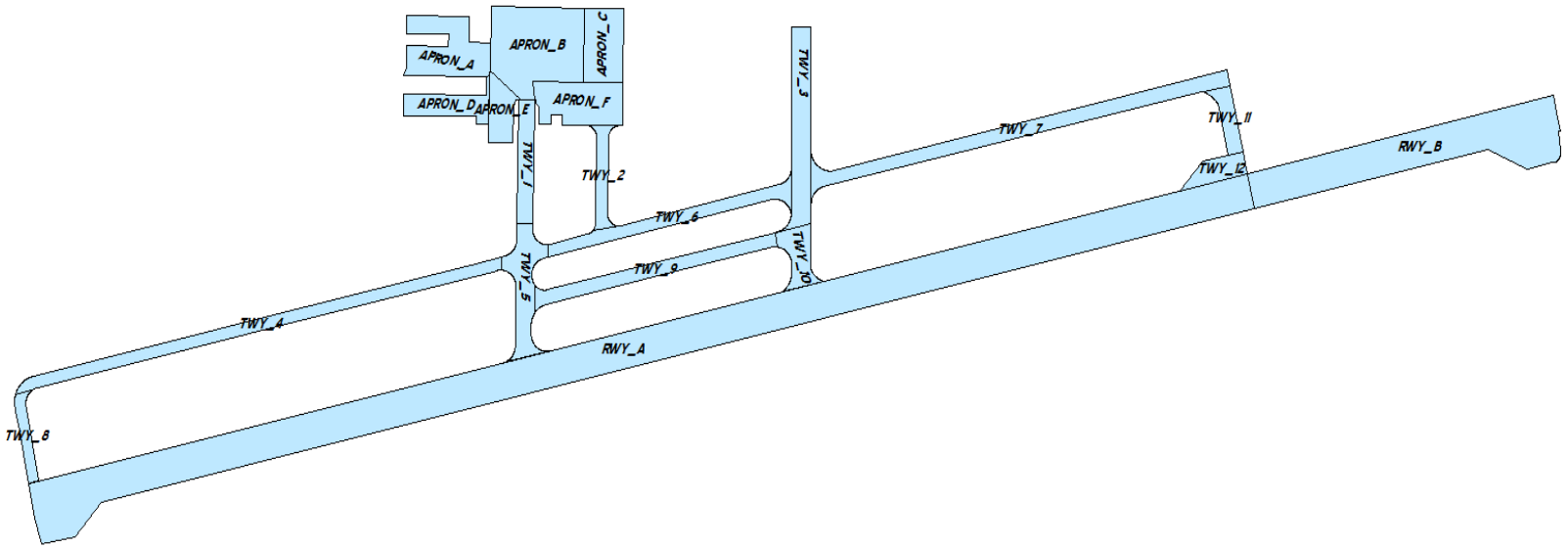
AC Airfield Distresses:

41. Alligator Cracking
42. Bleeding
43. Block Cracking
44. Corrugation
45. Depression
46. Jet Blast
47. Joint Reflection
48. Long. Cracking
49. Oil Spillage
50. Patching
51. Polished Aggregate
52. Raveling
53. Rutting
54. Shoving From PCC
55. Slippage Cracking
56. Swell
57. Weathering

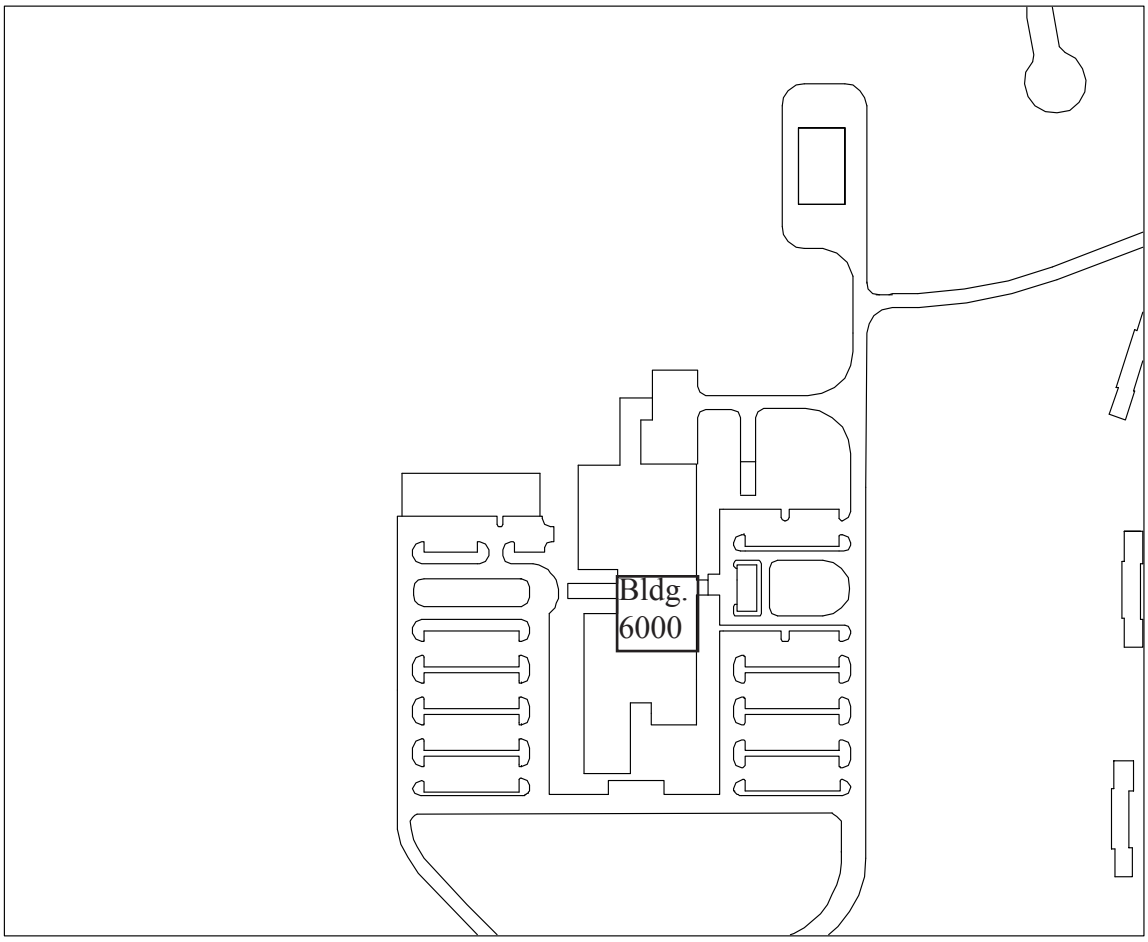
PCC Airfield Distresses:

61. Blowup
62. Corner Break
63. Cracks
64. Durability Cracking
65. Joint Seal Damage
66. Patching, Small
67. Patching, Large
68. Popouts
69. Pumping
70. Scaling
71. Settlement
72. Shattered Slab
73. Shrinkage Cracks
74. Spalling, Joints
75. Spalling, Corner
76. ASR

Note: All pavement is asphalt except the apron, which is concrete



Sample Roadway And Parking Lot Network



Network I.D.:
MAIN_POST

Agency Name/Number:
Base Name
City, State

Branch/Section I.D.:
PL6000/01-14

Comments:

AC Distresses
(units for inspection)
1. Alligator Cracking (sf)
2. Bleeding (sf)
3. Block Cracking (sf)
4. Bumps and Sags (lf)
5. Corrugation (sf)
6. Depression (sf)
7. Edge Cracking (lf)
8. Joint Reflection Cracking (lf)
9. Lane/Shoulder Drop-Off (lf)
10. Long. & Trans. Cracking (lf)
11. Pat. & Util. Cut Pat. (sf)
12. Polished Aggregate (sf)
13. Potholes (sf)
14. Railroad Crossing (sf)
15. Rutting (sf)
16. Shoving (sf)
17. Slippage (sf)
18. Swell (sf)
19. Weathering (sf)

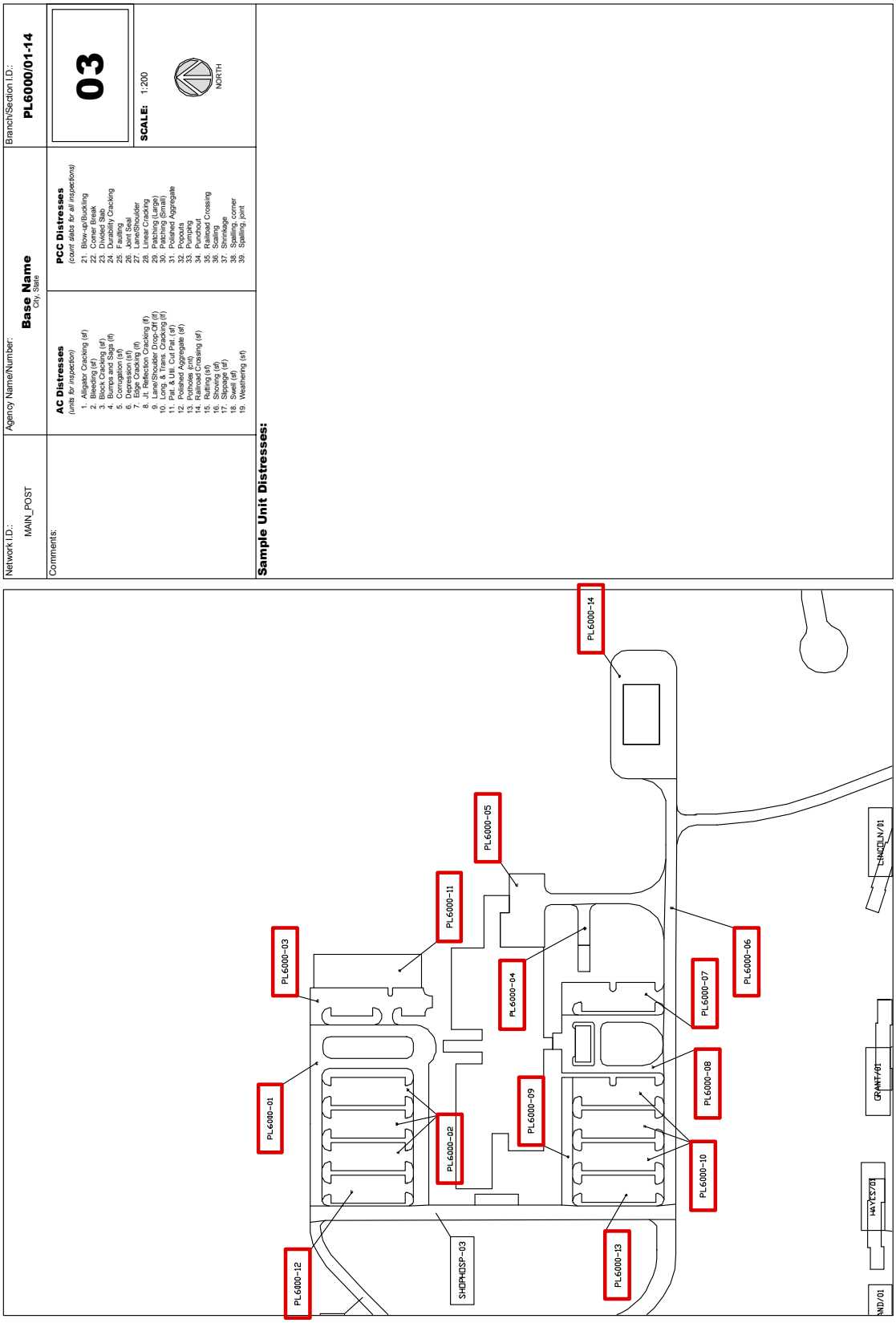
PCC Distresses
(count slabs for all inspections)
21. Blow-up/Buckling
22. Corner Break
23. Divided Slab
24. Durability Cracking
25. Faulting
26. Joint Seal
27. Lane/Shoulder
28. Linear Cracking
29. Patching (Large)
30. Patching (Small)
31. Polished Aggregate
32. Popouts
33. Pumping
34. Punchout
35. Railroad Crossing
36. Scaling
37. Shrinkage
38. Spalling, Corner
39. Spalling, joint

03

SCALE: 1:200

NORTH

Sample Unit Distresses:


Network I.D.:
MAIN_POST
Agency Name/Number:
Base Name
City, State
Branch/Section I.D.:
PL6000/01-14
Comments:
AC Distresses
(units for inspection)
1. Alligator Cracking (sf)
2. Bleeding (sf)
3. Block Cracking (sf)
4. Bumps and Sags (lf)
5. Corrugation (sf)
6. Depression (sf)
7. Edge Cracking (lf)
8. Jt. Reflection Cracking (lf)
9. Lane/Shoulder Drop-Off (lf)
10. Long. & Trans. Cracking (lf)
11. Patch/Utility Cut (sf)
12. Polished Aggregate (sf)
13. Potholes (cnt)
14. Railroad Crossing (sf)
15. Rutting (sf)
16. Shoving (sf)
17. Slippage (sf)
18. Swell (sf)
19. Weathering (sf)
PCC Distresses
(count slabs for all inspections)
21. Blow-up/Buckling
22. Corner Break
23. Divided Slab
24. Durability Cracking
25. Faulting
26. Joint Seal
27. Lane/Shoulder
28. Linear Cracking
29. Patching (Large)
30. Patching (Small)
31. Polished Aggregate
32. Popouts
33. Pumping
34. Punchout
35. Railroad Crossing
36. Scaling
37. Shrinkage
38. Spalling, corner
39. Spalling, joint
03
SCALE: 1:200
NORTH
Sample Unit Distresses:
PL6000-01
PL6000-02
PL6000-03
PL6000-04
PL6000-05
PL6000-06
PL6000-07
PL6000-08
PL6000-09
PL6000-10
PL6000-11
PL6000-12
PL6000-13
PL6000-14
SHOPHOSP-03
LINCOLN/01
GRANT/01
HAYES/01

Workshop 2: Inventory

Objectives

Create new inventory within a PAVER™ database, and understand how to add digital images to the image library, or store a link to images located elsewhere.

Database

Create a new database by clicking File >> New Database, and save as file name Class.

Tasks

1. Create a new database named Class. Within the Class database, create a network named Exercise and Branches and Sections as outlined on the following page.
2. Create a section user-defined field to record the shoulder type, and add the following selections:
   - None
   - Paved AC
   - Paved PCC
   - Gravel
   - Grass
3. Associate a digital image of your choice with the newly created sections.

Supplemental Airfield Inventory Information

(To be used on the created Class database)

Network ID: Exercise

Network Name: Exercise

Branch ID: RW 6-24
Branch Name: Runway 624
Branch Use: Runway

Section ID: 02B
From: 5+00
To: 18+00
Last Construction Date: 06/23/1985
Pavement Rank: P
Surface Type: AC
Length: 1300 ft
Width: 100 ft
Area Adjustment: 0

Branch ID: Spring-St
Branch Name: Spring Street
Branch Use: Roadway

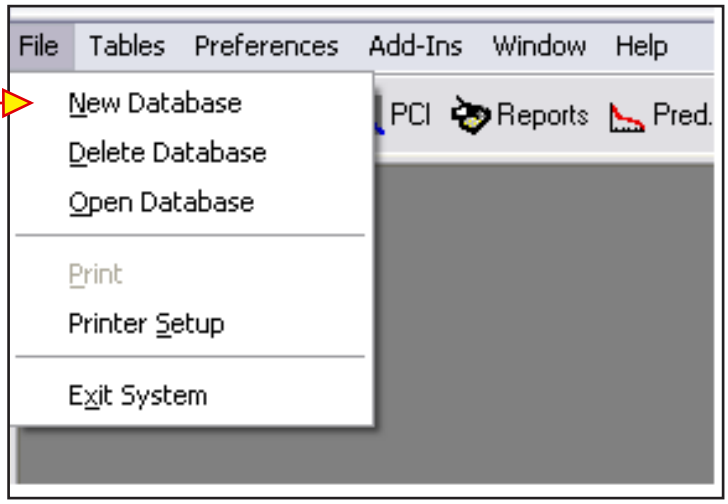
Section ID: 02
From: East side of 2nd Avenue
To: East Side of 3rd Avenue
Last Construction Date: 08/17/1991
Pavement Rank: S
Surface Type: PCC
Length: 600
Width: 30
Area Adjustment: 0
Slab Size: 15 X 15

Hints & Solution Guide For Workshop 2

1. Creating the network, branch, and sections:

   - Create a new database named Class by clicking File >> New Database. Save the created Class database in the User Data folder. Once the database has been created, the path to the Class database will be visible in the bottom left corner of the PAVER™ program window.

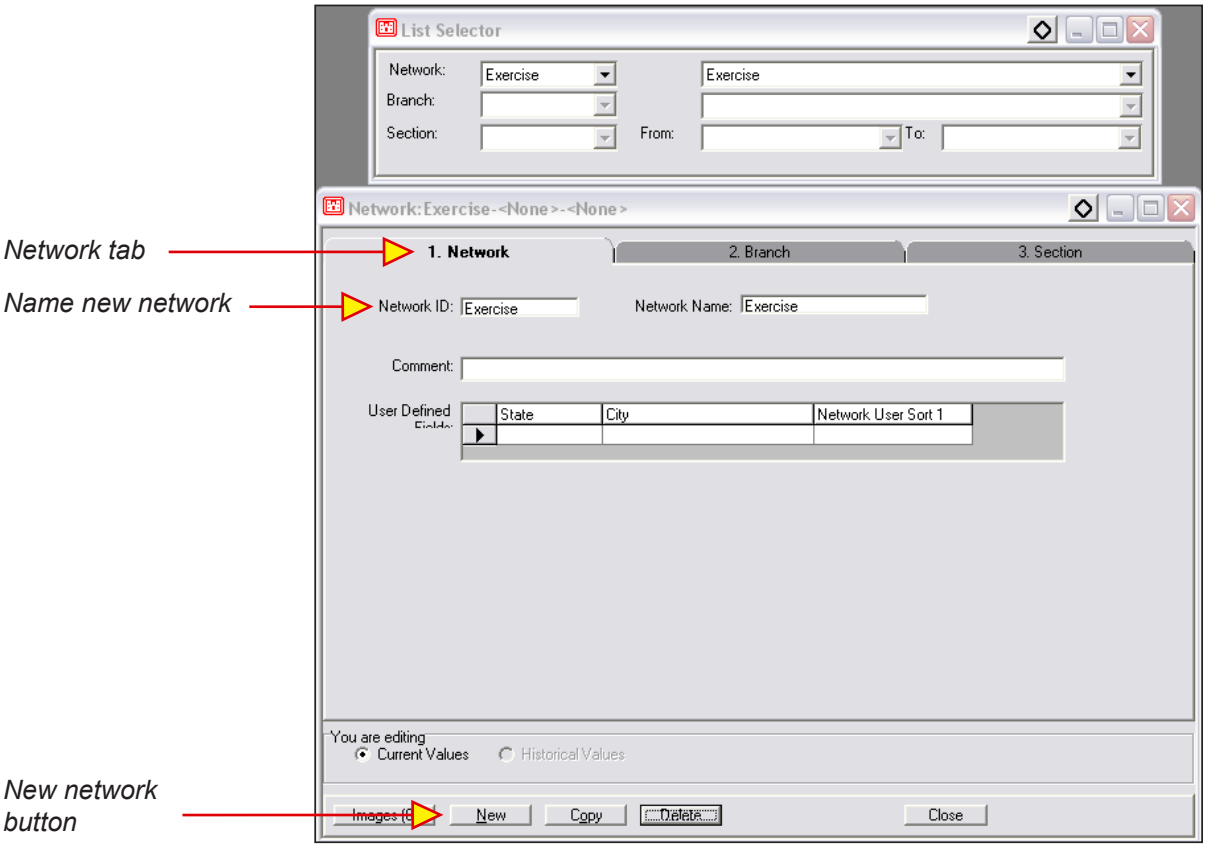
New database



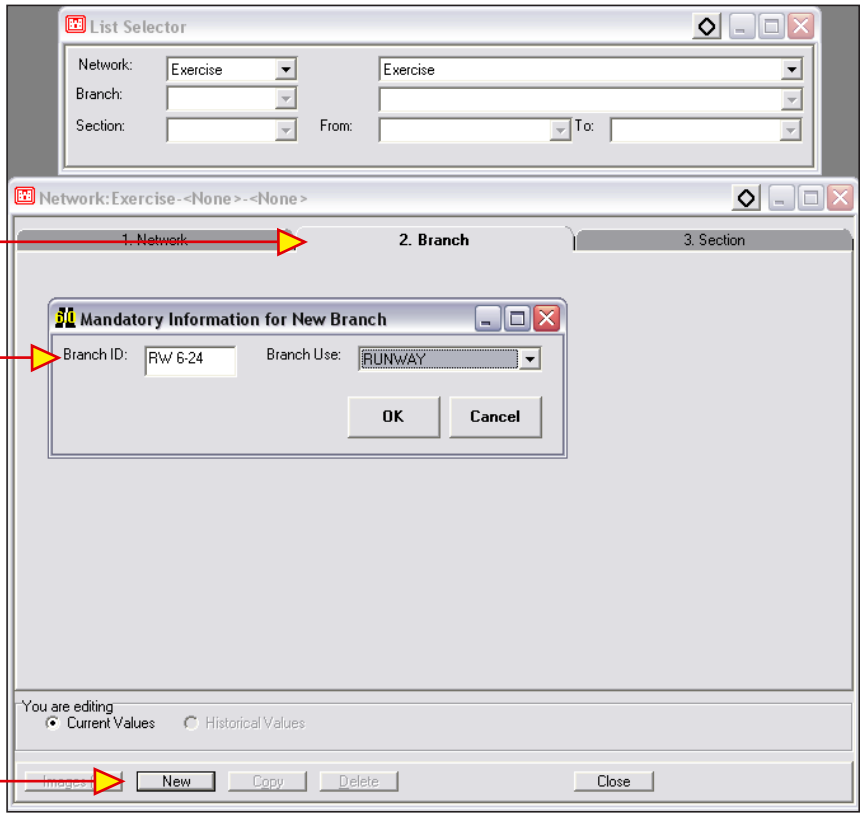
   - Click Inventory on the PAVER™ button bar.

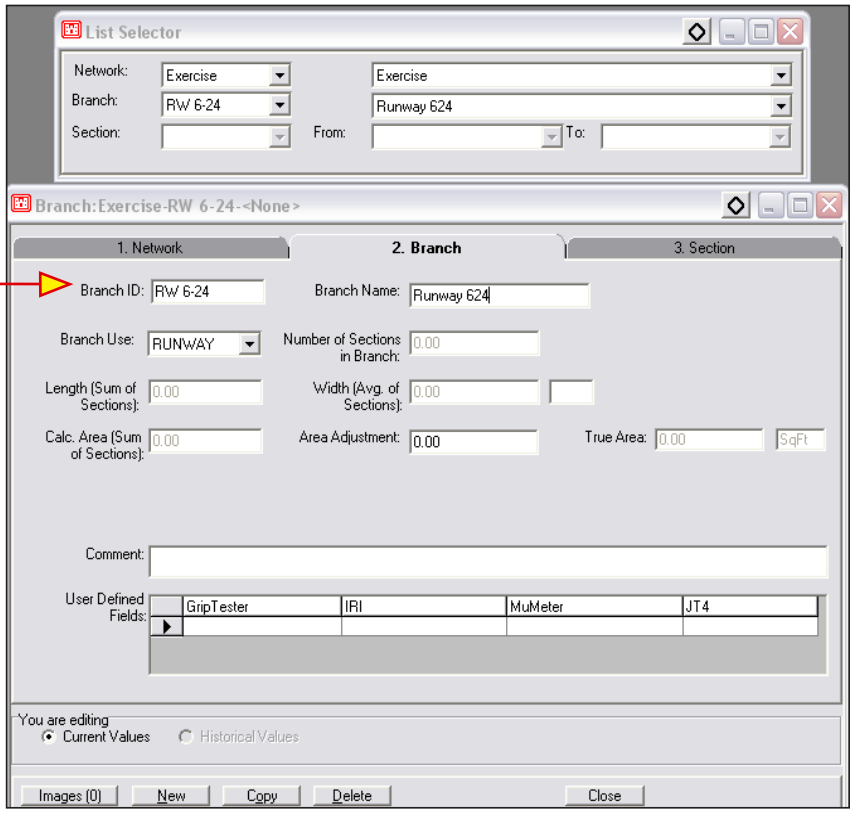
Inventory button

- Within the Network tab click New, and in the Network ID and Network Name boxes type Exercise.



- Within the Branch tab click New and enter Branch Id, Branch Name, and Branch Use information. Use the drop-down list for Branch Use. Select OK

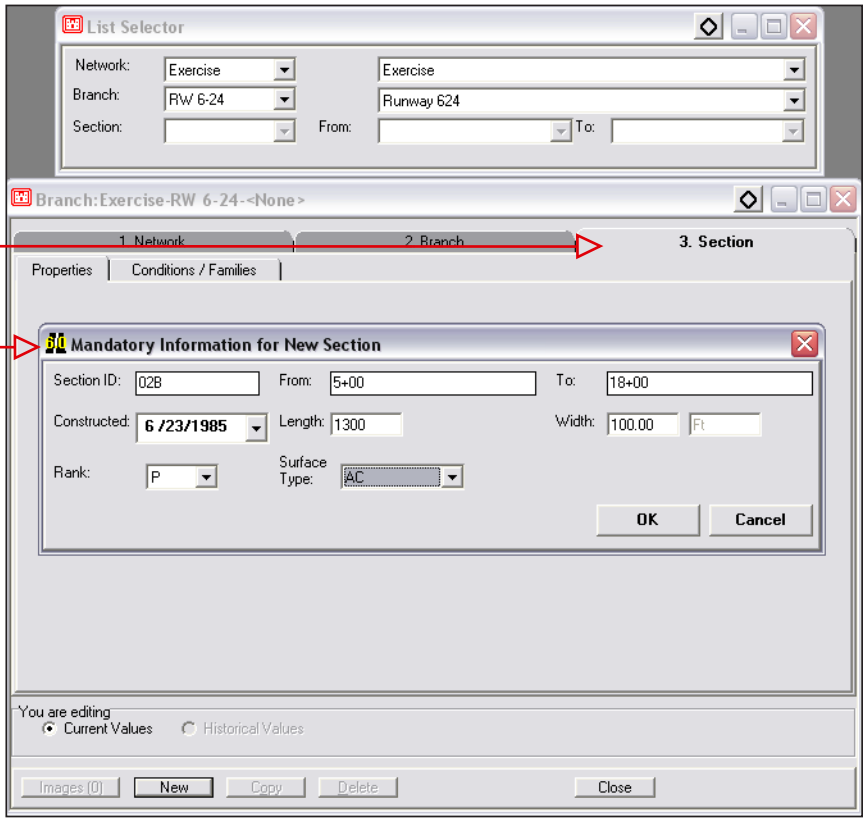




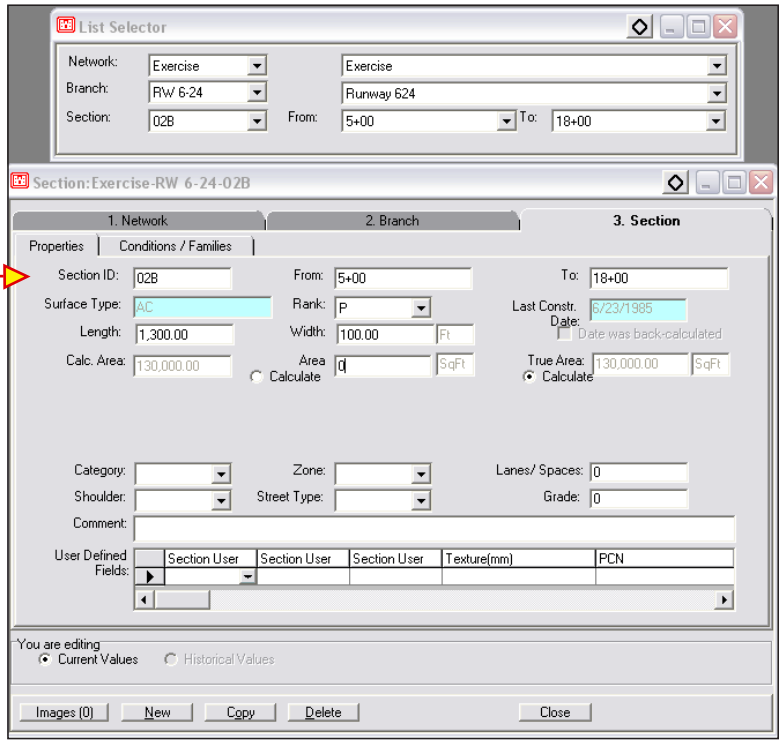
- Within the Section tab enter the section information. Use the drop-down lists for Rank and Surface Type.

Section tab

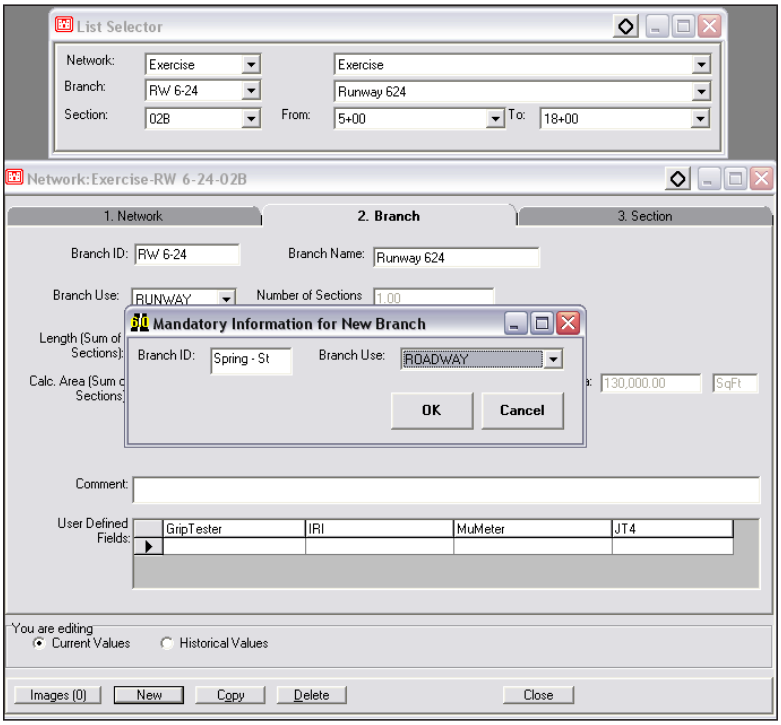
Configure new section

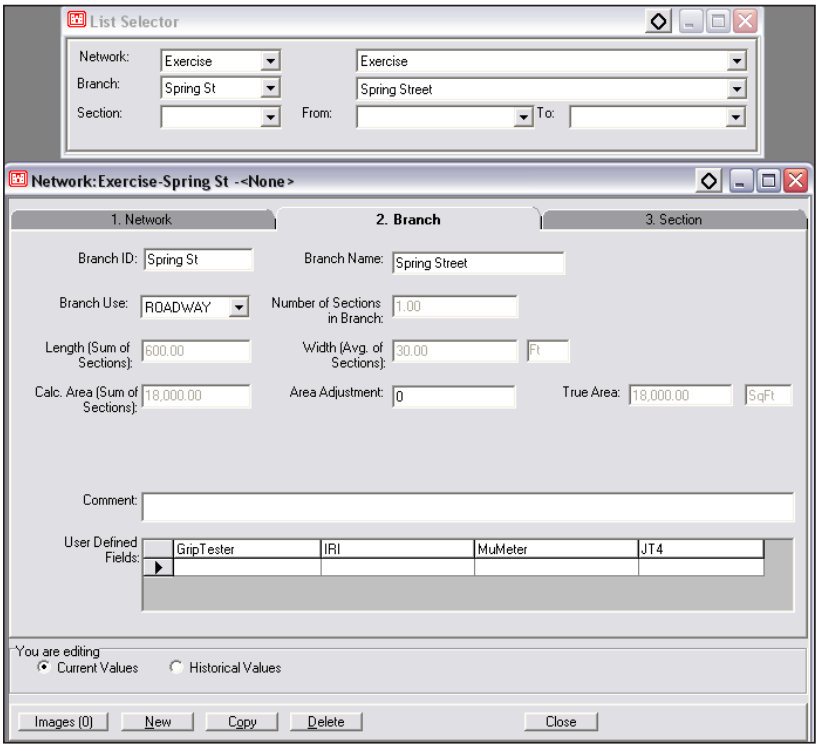


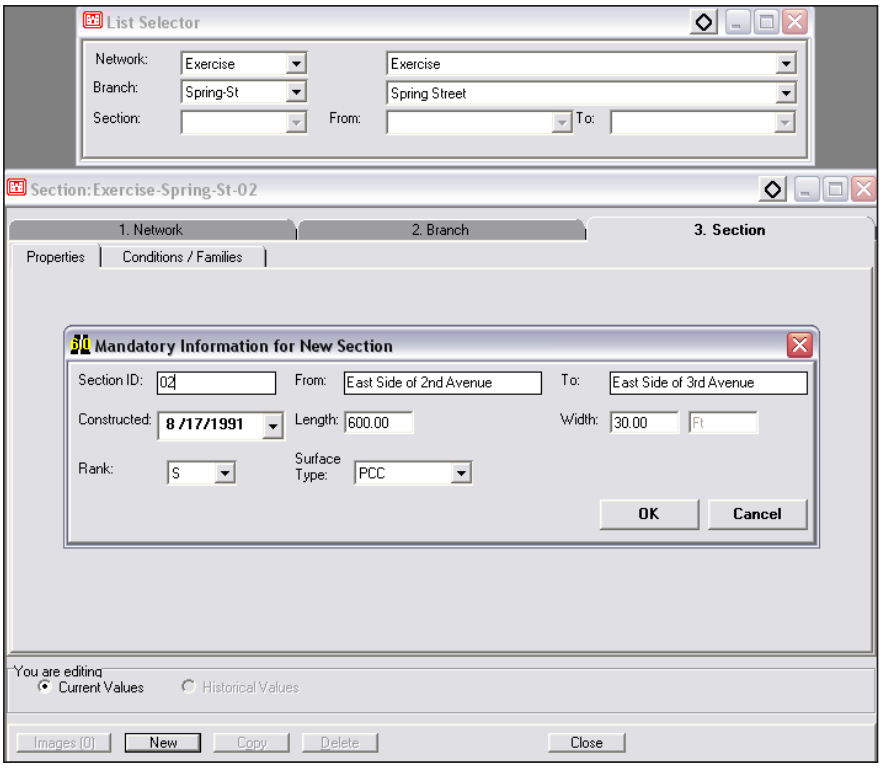
New section information



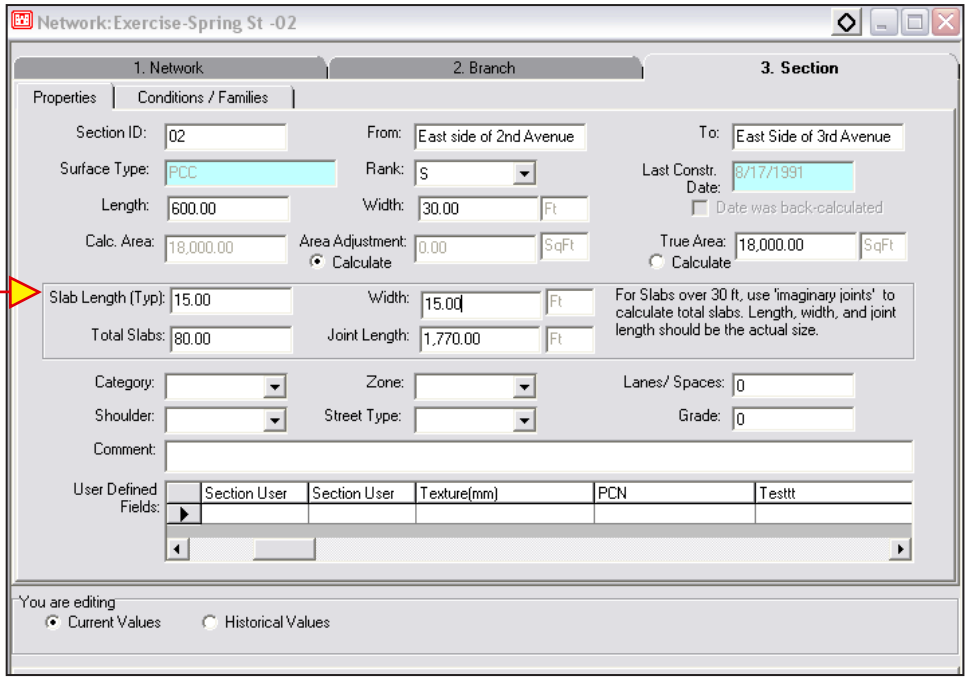
- To create the next section, first create a new branch by selecting New on the Branch tab, then create the section utilizing the same procedure from above. Since this section is concrete, several new fields will appear in the middle of the section form. Enter slab length and width, and the program will automatically calculate the number of slabs and the joint length. Despite the automatic calculation, the user can still edit the actual number of slabs and joint length.





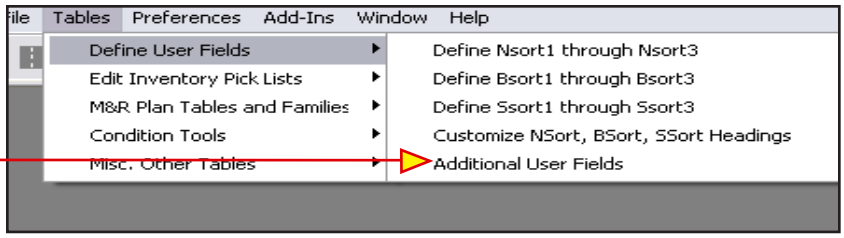


Enter in the Slab Length and Width as seen here



2. To create and edit a user-defined field:

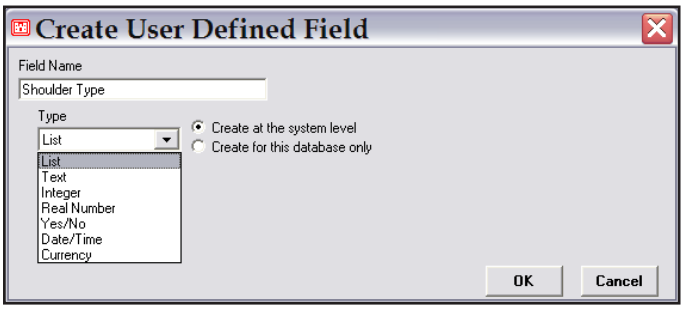
   - Close the inventory window, and within the Tables drop-down list select Define User Fields >> Additional User Field.



User Fields

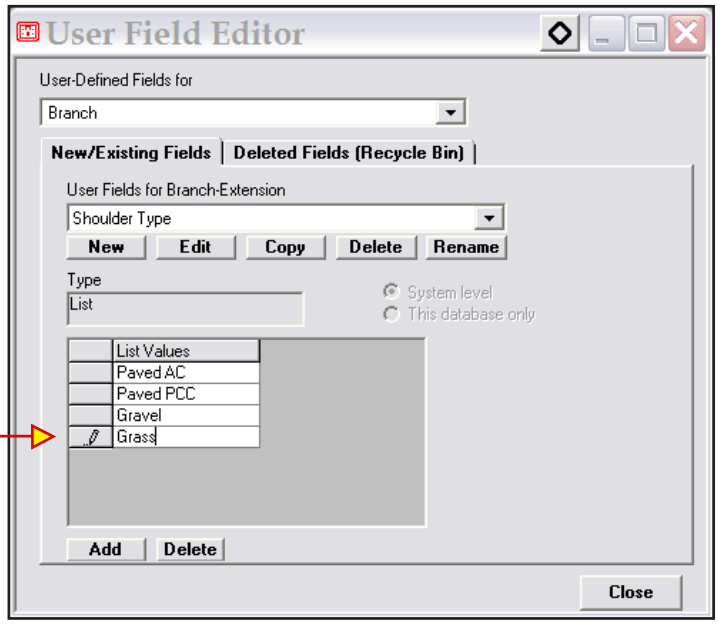
Note: There are 7 fixed user fields at the Branch level of inventory.

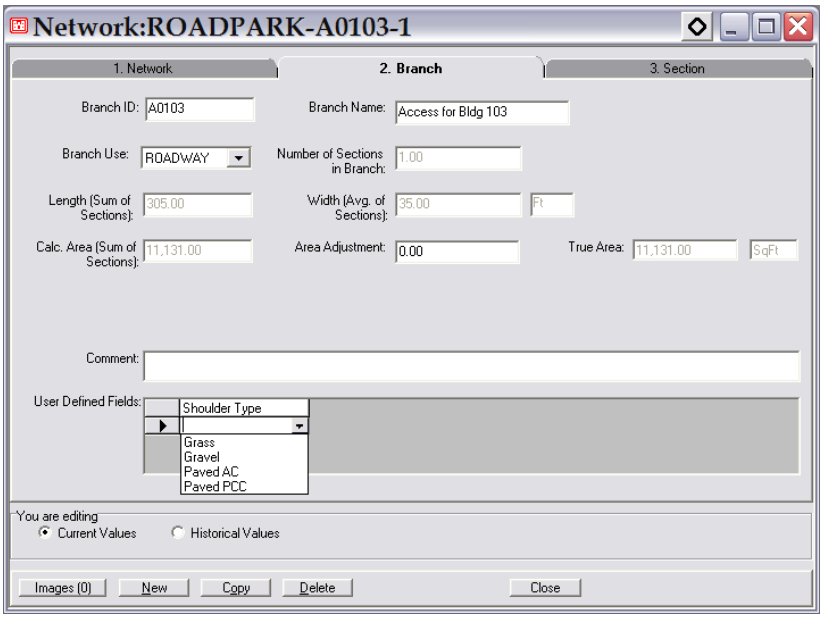
- Go to the User-Defined Field for Branch and then select New. Change the Field Name from New to Shoulder Type, then select List option from the drop down menu, and then click OK.



- Click Add and change the Name from New to Paved AC. Repeat this process to add Paved PCC, Gravel, and Grass shoulder types, then close the window.
- Check your work by opening the inventory form and clicking on the branch tab. There should be a field at the bottom named Shoulder Type that has the following values in its drop-down list: Paved AC, Paved PCC, Gravel, and Grass.

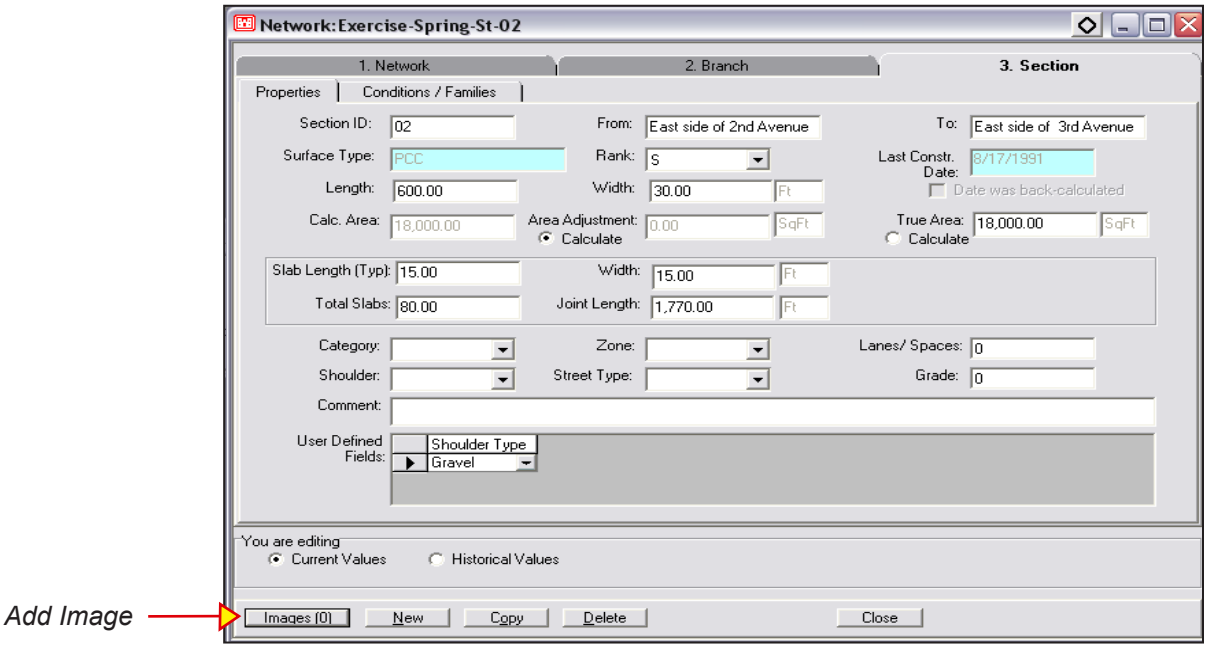
Manually enter info





3. To store images with the database:

- Open the inventory form, and using the list selector choose the Network named Exercise, Branch Spring St, and Section 02. Click on the Images button as seen below.

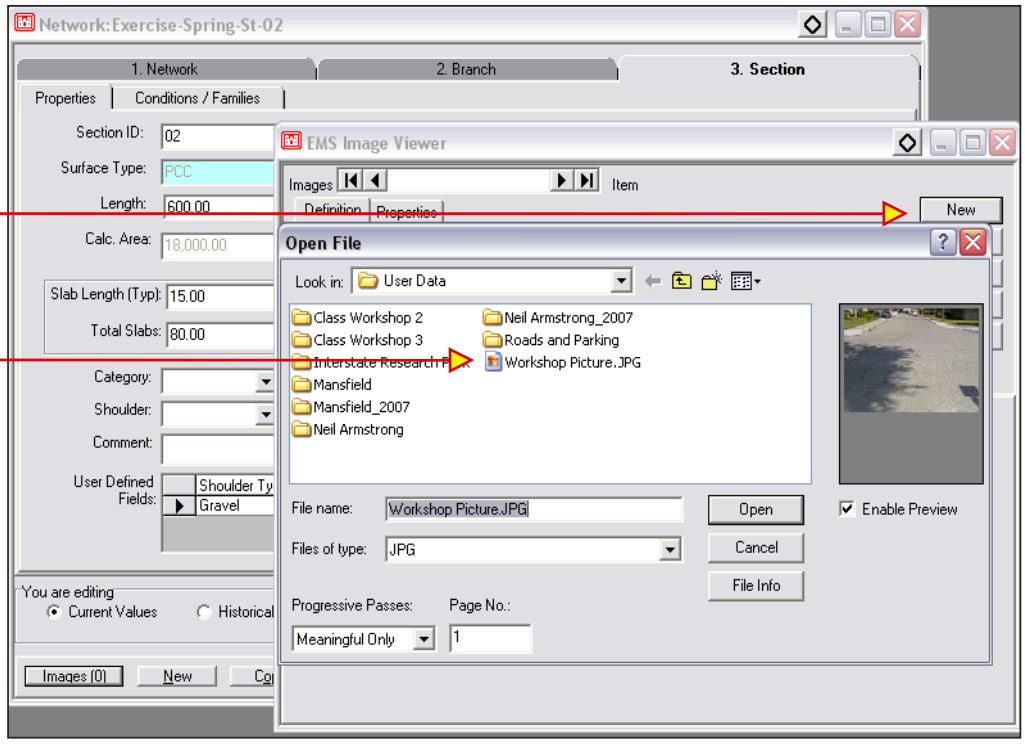


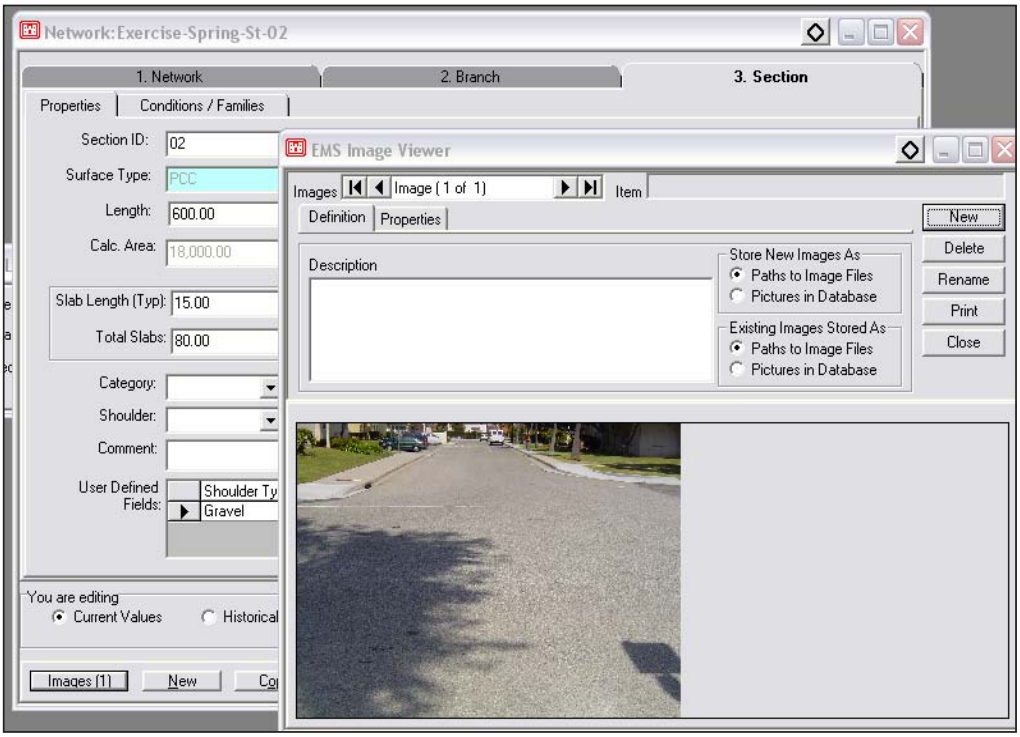
Add Image

- To add an image to the EMS Image Viewer, click New and choose the image file to add. For now, add the image file, "Workshop Picture.jpg" that is provided in the User Data Folder.

Add new image

Browse for image





Note: Images can be stored inside an image database which is associated with the pavement data, or you can store the path to an image located elsewhere, such as a CD.

Workshop 3: Field Inspection Data Entry

Objectives

Create inspection data entries for sections, create sample units, and enter PCI inspection data.

Database

Open the Class Workshop 3 database by clicking File >> Open Database, then select Class Workshop 3.pvr and click Open (When opening a database, always select *databasename.pvr* instead of the database folder).

Tasks

1. Create new inspection dates for several sections.
2. Enter the PCI field inspection data on the following page:

Survey Information

(To be used on the Class Workshop 3 database)

Inspection Date: Today's Date (Screen shots will show 4/23/07 & 4/25/07)
Branch: RW 6-24
Section: 02B
Total Number of Samples (N) = 26

Sample: 01
Sample Type: Random
Sample Size: 5000 sf

Distress	Severity	Quantity
41 – Alligator Cracking	M	1000 sf
41 – Alligator Cracking	L	100 sf
48 – L&T Cracking	L	180 ft

Sample: 02
Sample Type: Random
Sample Size: 5000 sf

Distress	Severity	Quantity
41 – Alligator Cracking	M	1000 sf

Inspection Date: Today's Date (Screen shots will show 4/23/07 & 4/25/07)
Branch: Spring-St
Section: 02
Total Number of Samples (N) = 4

Sample: 01
Sample Type: Random
Sample Size: 20 slabs

Distress	Severity	Quantity
28 – Linear CR	M	2
30 – Small Patch	M	4
26 – Joint Seal Damage	M	20

Sample: 02
Sample Type: Random
Sample: 20 slabs

Distress	Severity	Quantity
25 – Faulting	M	4
23 – Divided Slab	L	2
26 – Joint Seal Damage	M	20

Hints & Solution Guides For Workshop 3

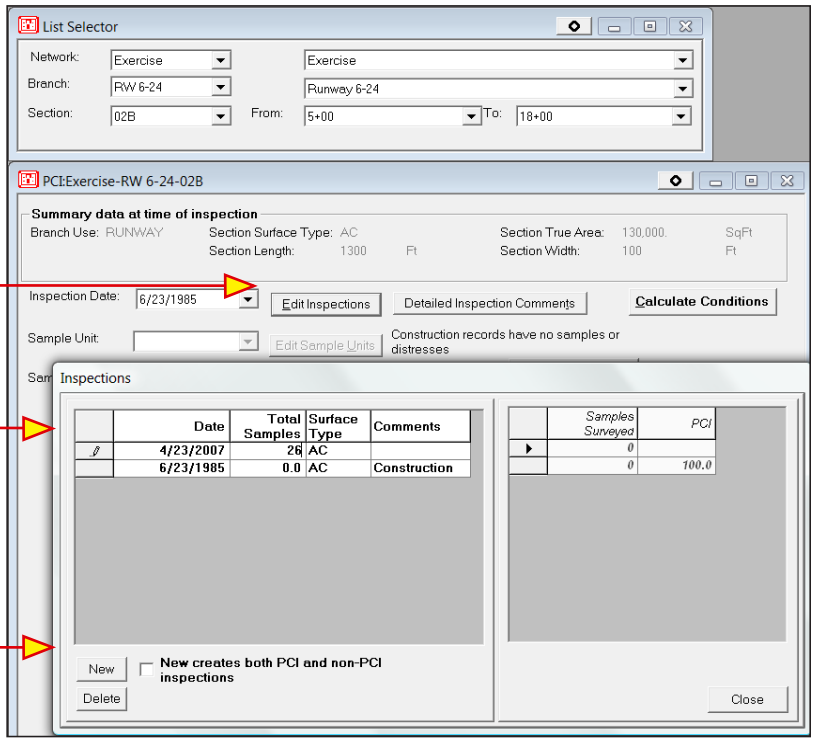
1. To add PCI inspection data in PAVER™:

- Open the Class Workshop 3 database by clicking File >> Open Database >> Class Workshop 3.pvr.
- Click PCI on the PAVER™ button bar, and using the list selector choose the Network named Exercise, Branch RW 6-24, Section 02B.
- To add a new inspection date, within the PCI window click Edit Inspections, then select New and type in the inspection date (today's date shows as the default). Enter the total number of sample units possible in the section = 26 (total area 130000 SF >> divided by normal sample size 5000 >> equals 26 sample units possible), not the number you actually inspected, and click Close.

Edit Inspections button

Enter inspection data

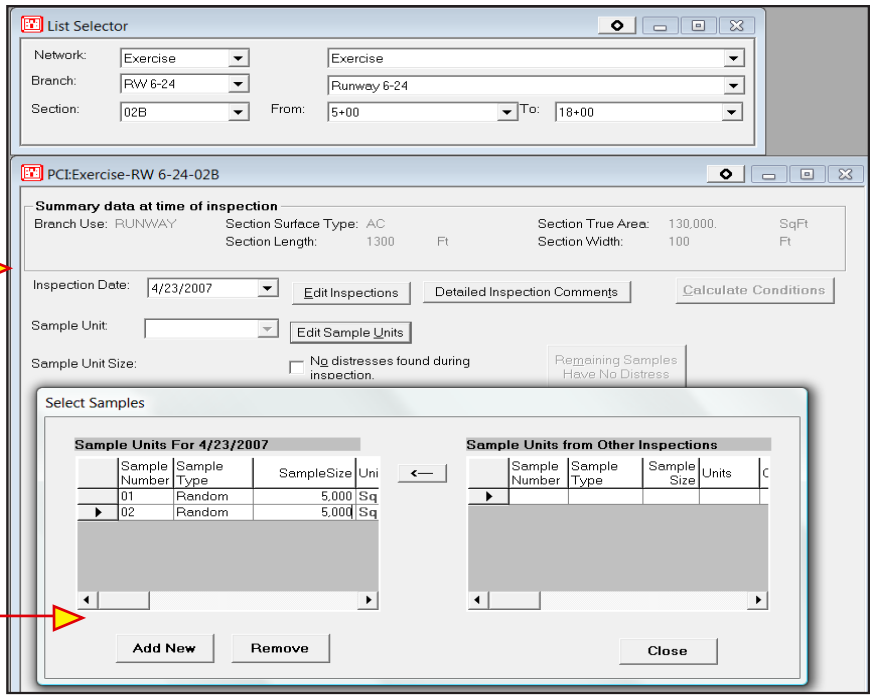
Click New to add inspection data



- Select Edit Sample Units then Add New, and enter 01 for the sample unit number. Under Sample Type, select Random from the drop-down list. Enter 5,000 for the sample unit size. Repeat this procedure for sample unit 02 and then click Close.

Edit/ create sample unit info

Add/ remove sample unit info

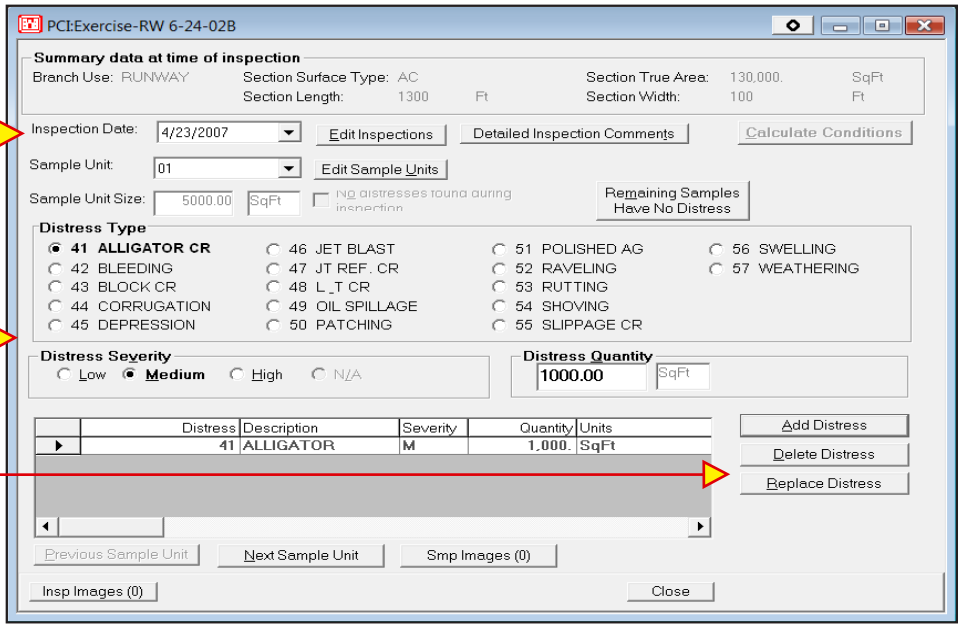


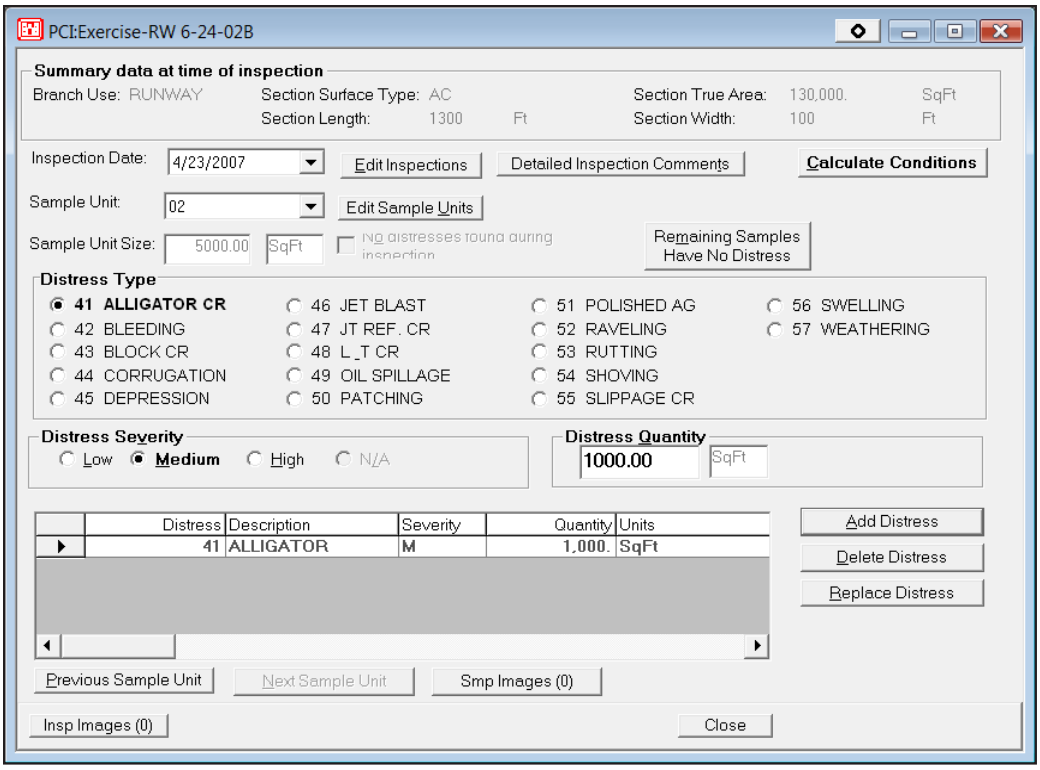
- Enter inspection data for sample unit 01 by clicking on the radio button next to the corresponding distress and severity level, and then entering in the quantity (per Survey Info at the beginning of this Workshop). When you finish entering the distress information, click Add and then proceed to enter the remaining distresses in the same fashion. When you are finished with sample unit 01, click on Next Sample Unit and repeat the distress entry for sample unit 02.

Selected inspection date and sample unit

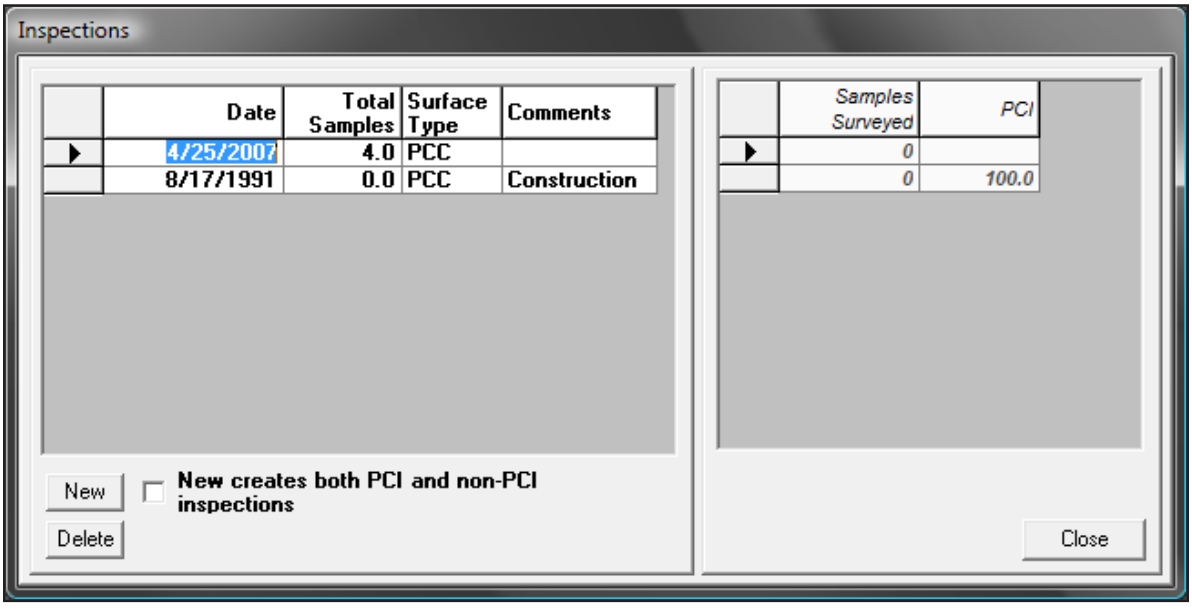
Enter sample distress type, severity, and quantity

Add/ delete/ replace distress data

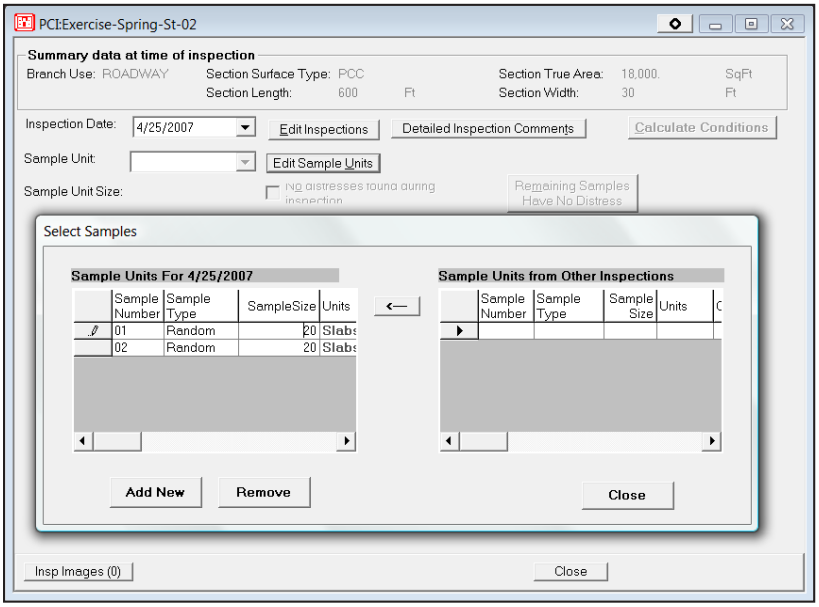




- Using the list selector, choose Network Exercise, Branch Spring-St, and Section 02.
- To add a new inspection date, click Edit Inspections >> New within the PCI window, and enter the inspection date (today's date shows as the default). Enter the total number of sample units in the section (80/20 = 4), not the number you actually inspected, and click Close.

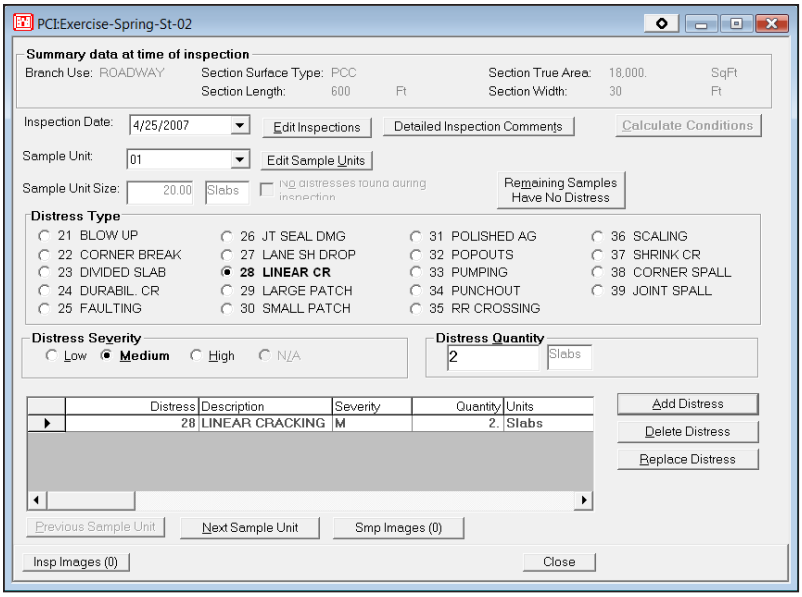


- Choose Edit Sample Units >> Add New, and enter 01 for the sample unit number. Under Sample Type select Random, and enter 20 for the sample unit size. Repeat this procedure for sample unit 02, and exit by selecting Close.



- Enter the inspection data for sample unit 01 by selecting the corresponding distress and severity level, and entering in the quantity (per Survey Info at the beginning of this Workshop). Click Add when you finish entering in the distress information, and enter the remaining distresses in the same fashion. When you are finished with that sample unit, select Next Sample Unit and repeat the distress entry process for sample unit 02.

Note: Distress 26 (Joint Seal Damage) is evaluated across the whole sample unit. As a result, the program automatically enters the size as the whole size of the sample unit.



Workshop 4a: Reports

Objectives

Create basic reports in PAVER™ to show the results of inspections and general inventory information. Additionally, develop custom reports that can be exported to Excel.

Database

Open the Roads and Parking database by clicking File >> Open Database, selecting Roads and Parking.pvr and clicking Open.

Tasks

1. Use the Summary Charts report to generate a chart of Branch Use vs. Weighted Average Condition. Change the title to read Condition by Pavement Use. Export the associated table to Excel.
2. Create a report using Standard Reports which shows the condition of each section at the last inspection.
3. Create a user-defined report that shows the Network, Branch, Section ID, Last Construction Date, Years Since Inspection, Last Inspection Date, and Latest PCI.

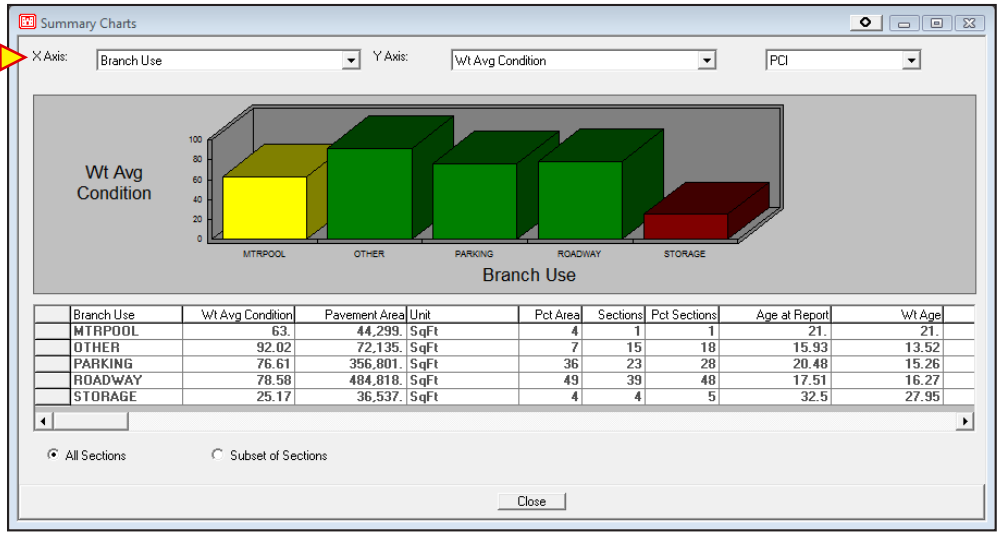
Hints & Solution Guides For Workshop 4a.

1. To use the Summary Charts:

- Open Roads and Parking database by clicking File >> Open Database >> Roads and Parking.pvr.
- Select Reports from the PAVER™ button bar.

- Select Summary Charts and click Continue.
- On the X-Axis drop-down list choose Branch Use and on the Y-Axis drop-down list choose Wt Avg Condition.

X- & Y-axis info

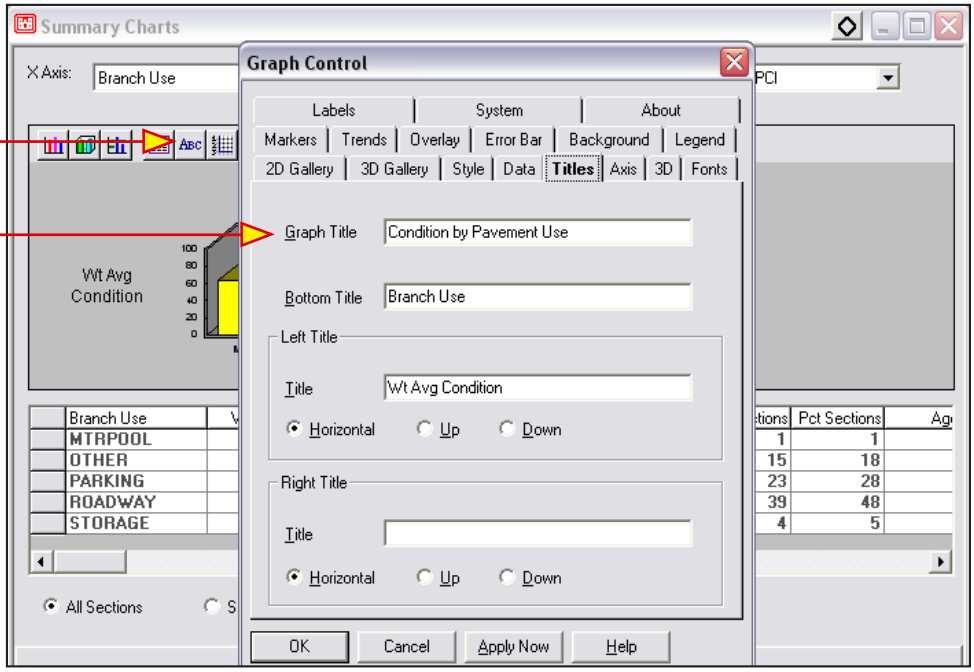


Branch Use	Wt Avg Condition	Pavement Area	Unit	Pct Area	Sections	Pct Sections	Age at Report	Wt Age
MTRPOOL	63.	44,299.	SqFt	4	1	1	21.	21.
OTHER	92.02	72,135.	SqFt	7	15	18	15.93	13.52
PARKING	76.61	356,801.	SqFt	36	23	28	20.48	15.26
ROADWAY	78.58	484,818.	SqFt	49	39	48	17.51	16.27
STORAGE	25.17	36,537.	SqFt	4	4	5	32.5	27.95

- Right-click on the graph and select Toolbar. When the icons appear, click on any icon to bring up the dialog box. Click on the Titles tab, and in the Graph Titles box type Condition by Pavement Use. To exit the graph control, click OK.

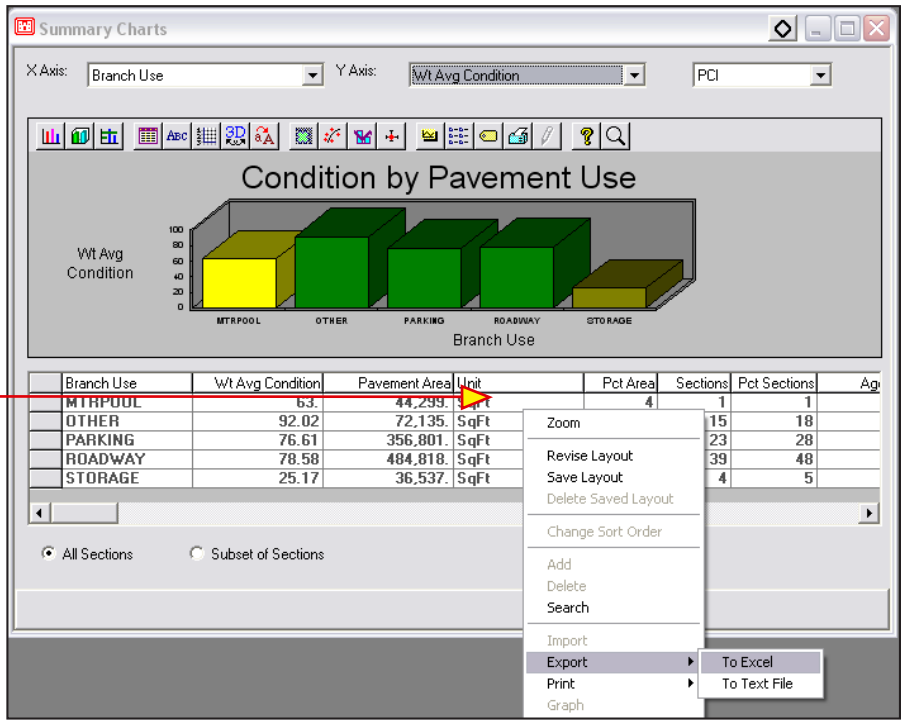
Titles tab

Enter data as shown



- To export the table, right-click on the Table and select Export To Excel. After this is done, review and close out of the report summary section.

Right-click for table options

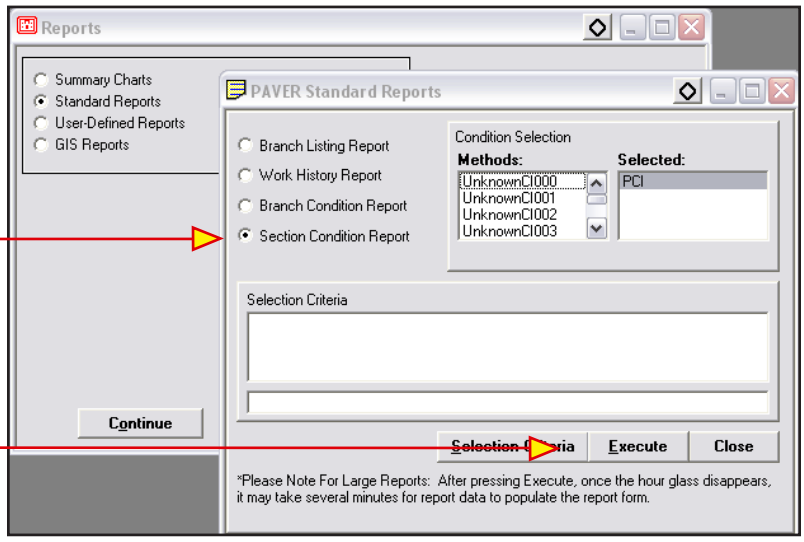


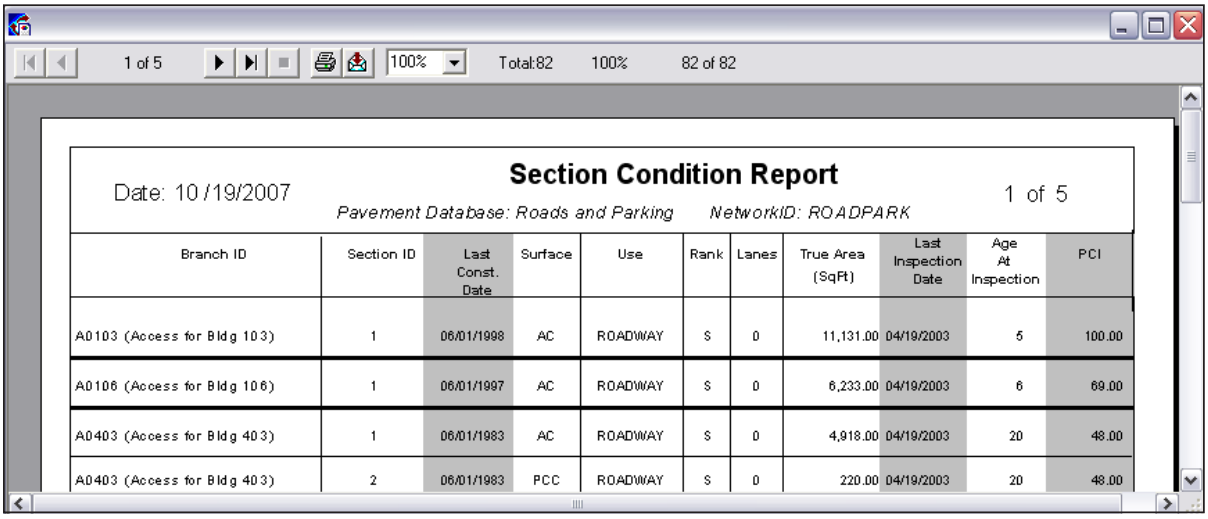
2. To create a standard report:

- Select Reports from the PAVER™ button bar, and then Standard Reports >> Continue.
- Select Section Condition Report, and under methods double-click PCI so it moves to the Selected box and then click Execute.

Section Condition Report

Execute button

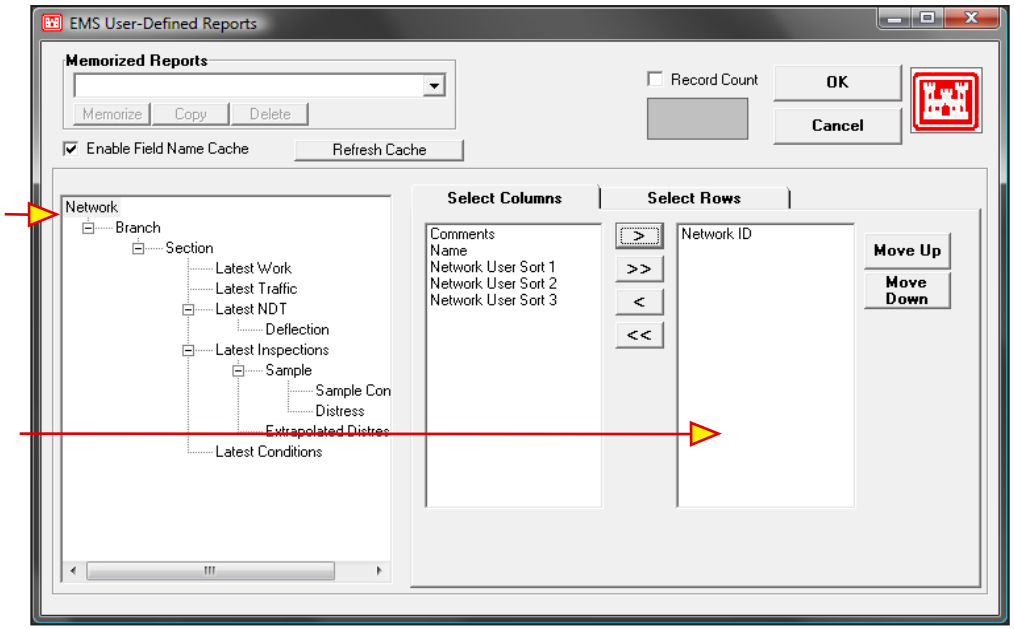



1 of 5
100%
Total:82
100%
82 of 82
Date: 10/19/2007
Section Condition Report
Pavement Database: Roads and Parking
NetworkID: ROADPARK
1 of 5
Branch ID
Section ID
Last Const. Date
Surface
Use
Rank
Lanes
True Area (SqFt)
Last Inspection Date
Age At Inspection
PCI
A0103 (Access for Bldg 103) 1 06/01/1998 AC ROADWAY S 0 11,131.00 04/19/2003 5 100.00
A0106 (Access for Bldg 106) 1 06/01/1997 AC ROADWAY S 0 6,233.00 04/19/2003 6 69.00
A0403 (Access for Bldg 403) 1 06/01/1983 AC ROADWAY S 0 4,918.00 04/19/2003 20 48.00
A0403 (Access for Bldg 403) 2 06/01/1983 PCC ROADWAY S 0 220.00 04/19/2003 20 48.00

- After creating the report and reviewing it, close out of the Section Condition Report and the Standardized reports.

3. To create a user-defined report:

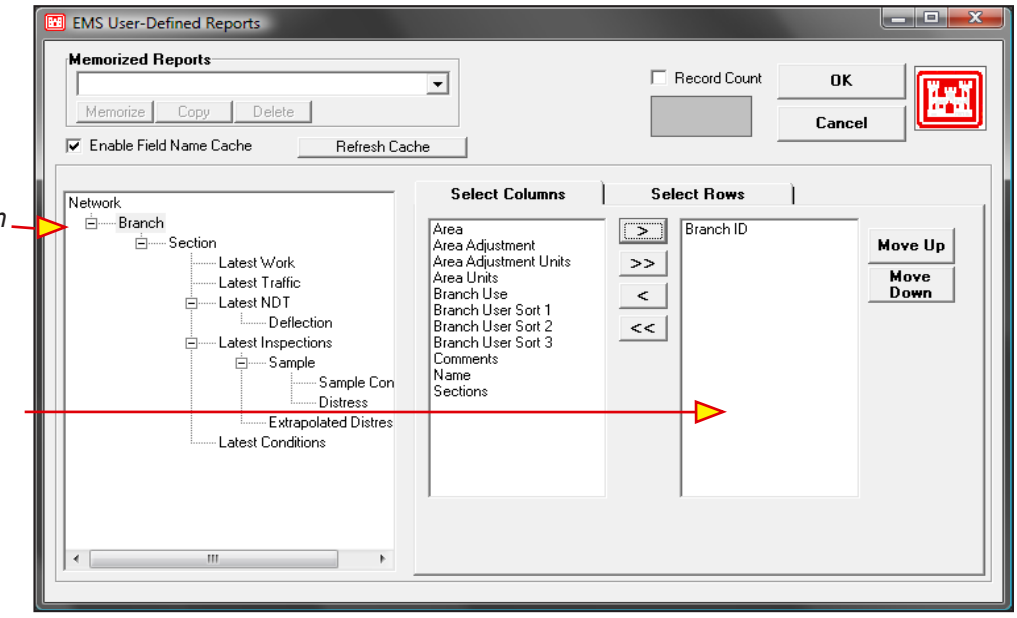
- Select Reports from the PAVER™ button bar, and then User-defined Reports >> Continue.
- Click Create New Report.
- In the tree list, highlight Network in the left tree list. Under the Select Columns tab, select Network ID and click the single right pointing arrow to move it to the right side table.



Selected network

Selected column

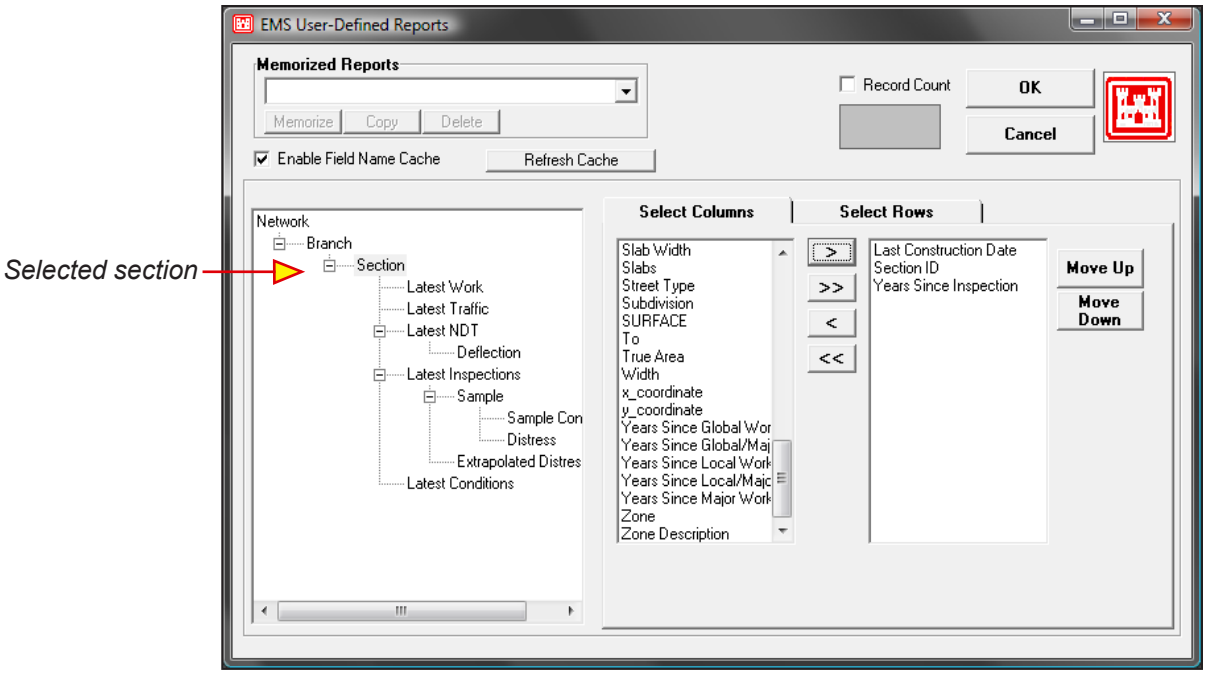
- Click on Branch in the tree list, and under Select Columns tab, choose Branch ID and click the single arrow pointing right to move it to the right side table.



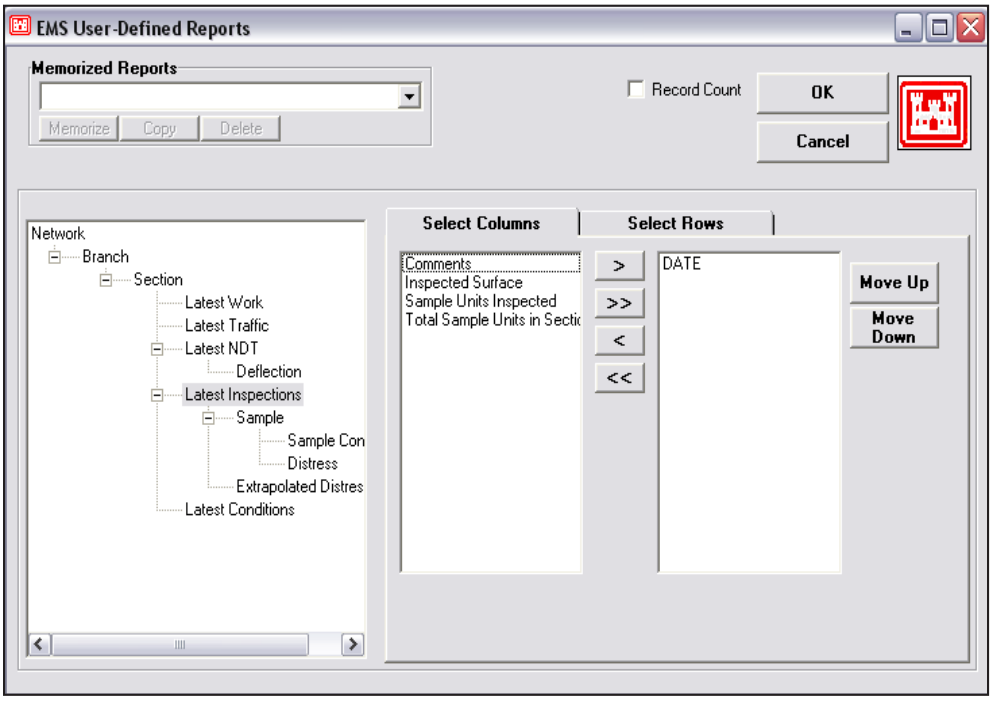
Selected branch

Selected column

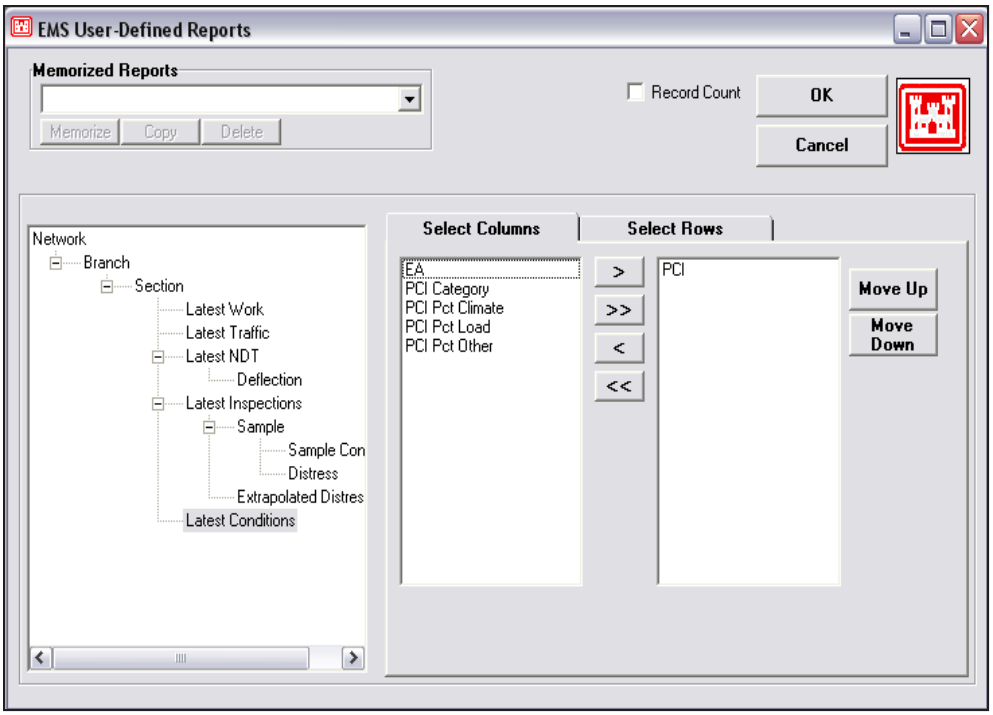
- Click on Section in the tree list, and under Select Columns choose Section ID and click the single arrow to move it to the right side. Highlight Last Construction Date and click the single arrow pointing right to move it to the right side table. Then, do the same for Years Since Inspection.



- In the tree list, select Latest Inspections, and then under Select Columns, click on Date and move it to the right side.



- In the tree list select Latest Conditions. Under Select Columns, click on PCI and move it to the right side.



- Click OK to view the report.

Workshop 4b: GIS

Objectives

Learn how to import, assign, and use a GIS shapefile in PAVER.

Database

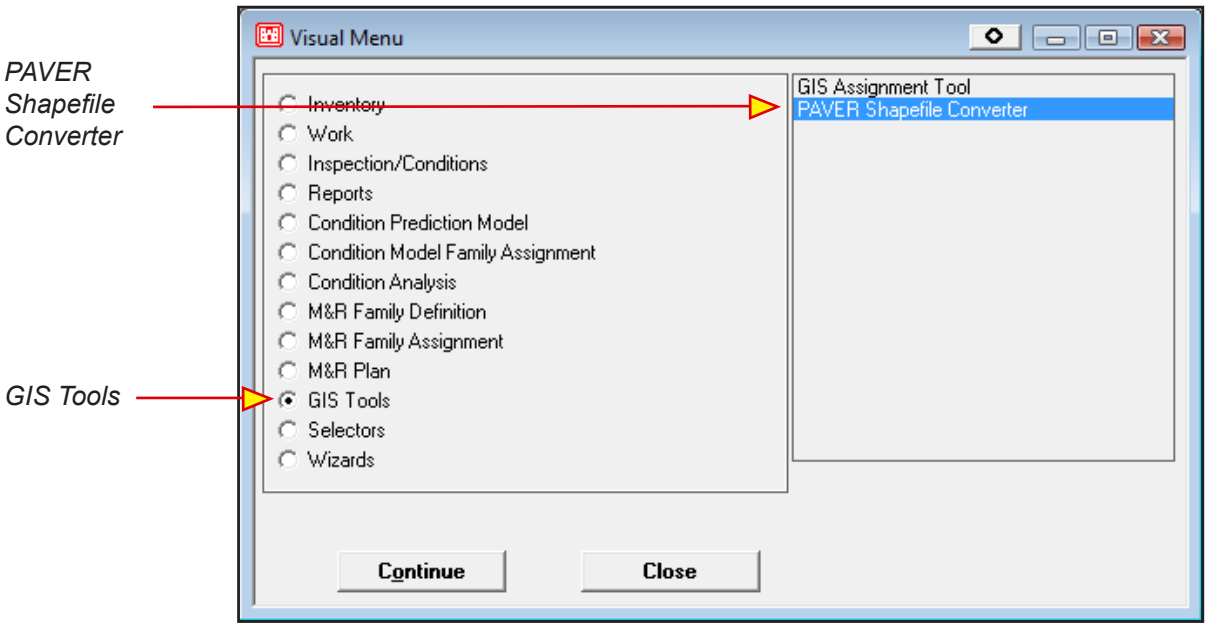
Open the Class Workshop 4b database by clicking File >> Open Database, selecting Class Workshop 4b.pvr and then click Open.

Tasks

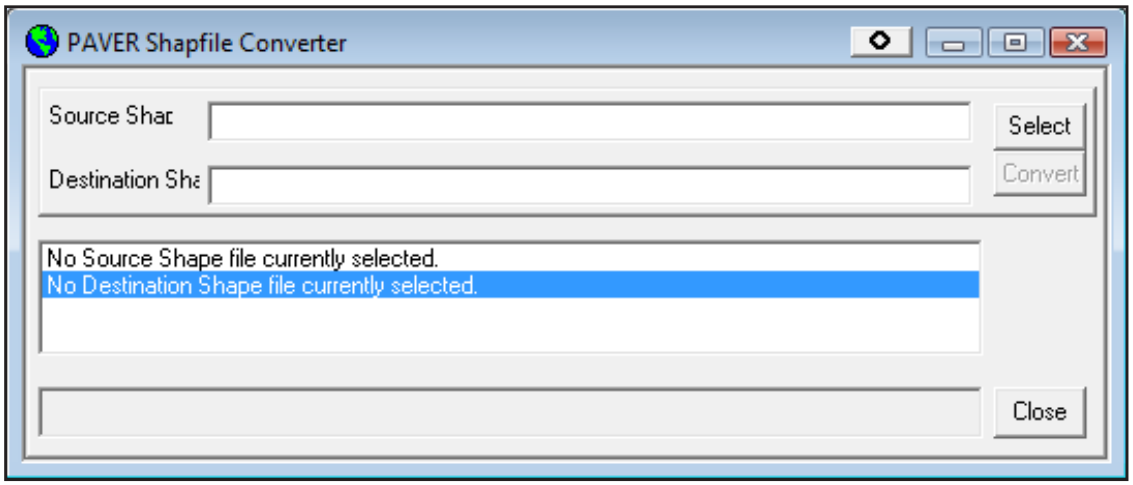
1. Use the GIS Tool “PAVER Shapefile Converter” to import a sectioned GIS shapefile.
2. Use the PAVER GIS assignment tool to link the previously imported shapefile to sections in the PAVER Class Workshop 4b database.
3. Create some GIS views that show Surface Type and Last PCI.

1. Use the PAVER Shapefile Converter Tool to import a GIS shapefile.

- Click on Visual menu , choose GIS tools, and highlight the PAVER Shapefile Converter option. Click the Continue button located at the bottom of the Visual Menu window.

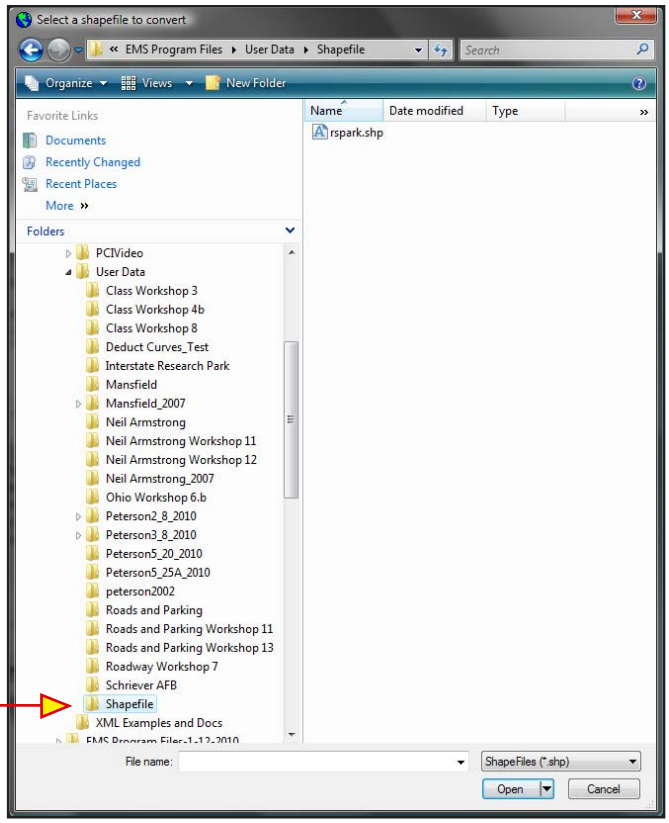


- The PAVER Shapefile Converter window will pop up as seen below.

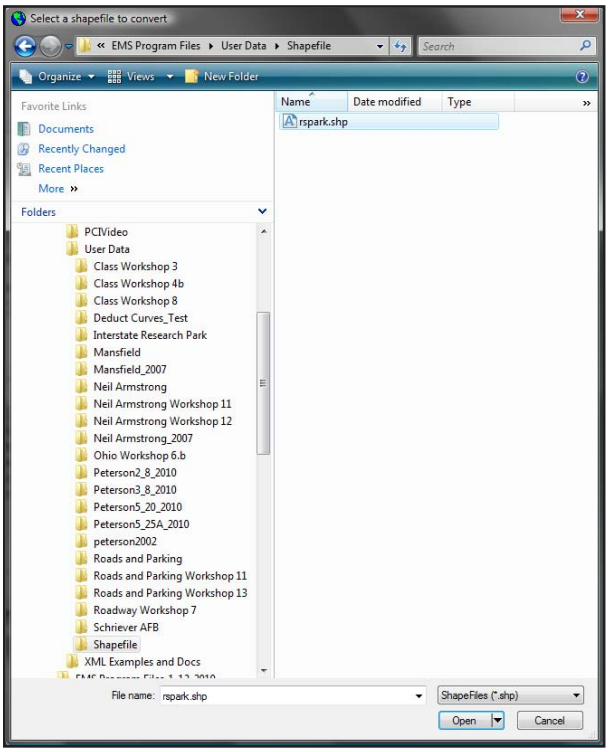


- Click the Select button on the PAVER Shapefile Converter form and then navigate to GIS Shapefile in the directory as seen below.

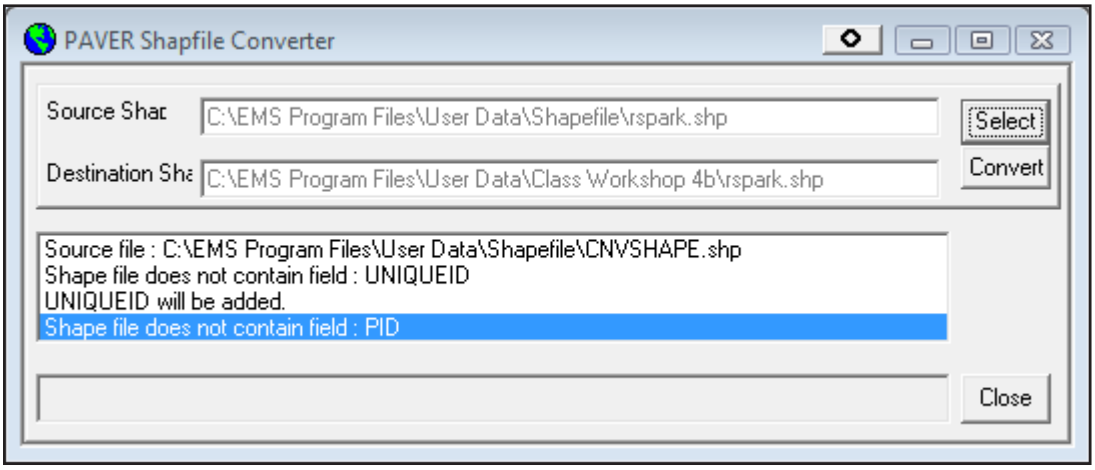
Navigate to this folder



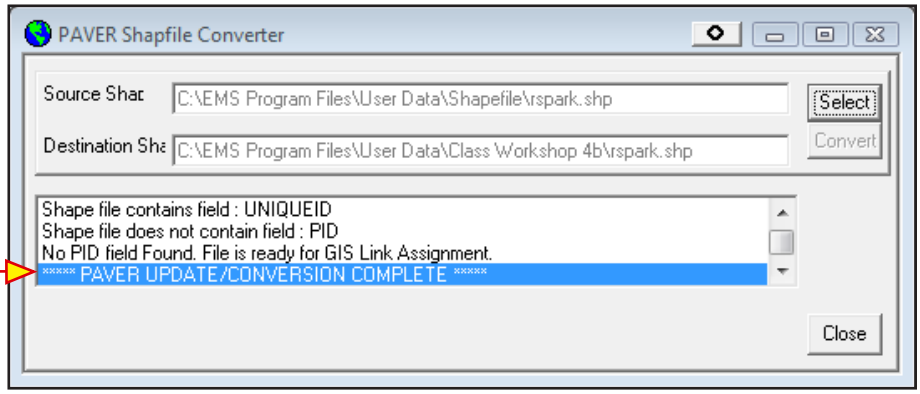
- Highlight the "rspark.shp" shapefile inside the Shapefile folder and click on the open button.



- Now, select the Convert button on the PAVER GIS Converter form to import the GIS Shapefile to the Class Workshop 4b database.



- Once the operation has been completed, Close out of the GIS Converter.

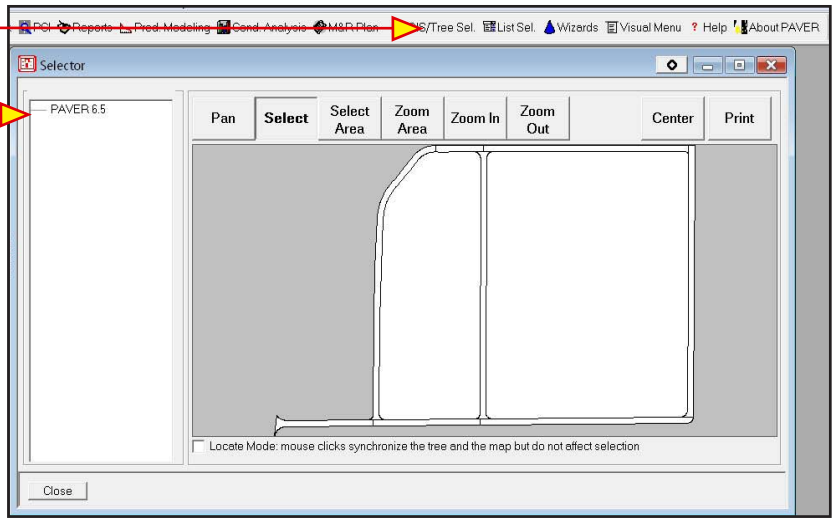

PAVER Shapfile Converter
Source Shac
C:\EMS Program Files\User Data\Shapefile\rspark.shp
Select
Destination Sha
C:\EMS Program Files\User Data\Class Workshop 4b\rspark.shp
Convert
Shape file contains field : UNIQUEID
Shape file does not contain field : PID
No PID field Found. File is ready for GIS Link Assignment.
***** PAVER UPDATE/CONVERSION COMPLETE *****
Close

Conversion Complete

- After closing the GIS Shapefile Converter, click on the GIS/Tree Sel. button to see your imported GIS Shapefile.

GIS / Tree Sel. Button

The Imported Shapefile and Tree Selector

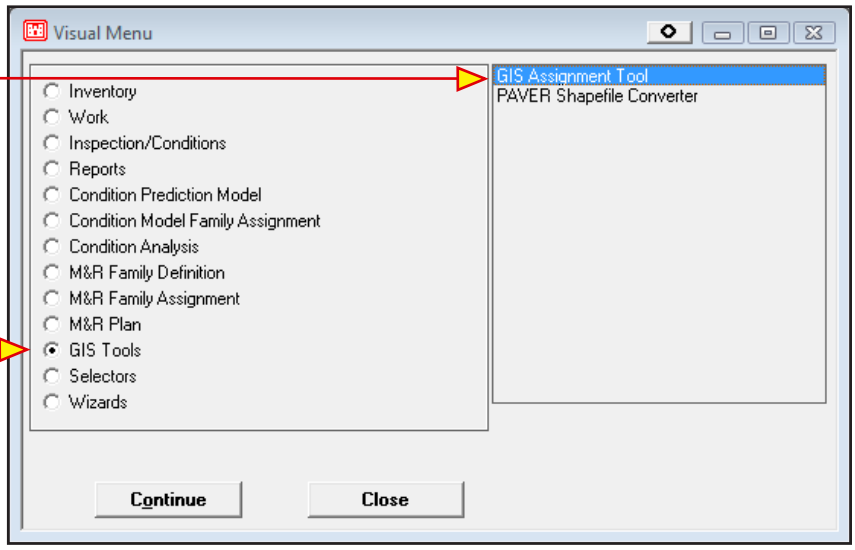


2. Use the PAVER GIS Assignment tool to link the previously imported shapefile to sections in the PAVER Class Workshop 4b database.

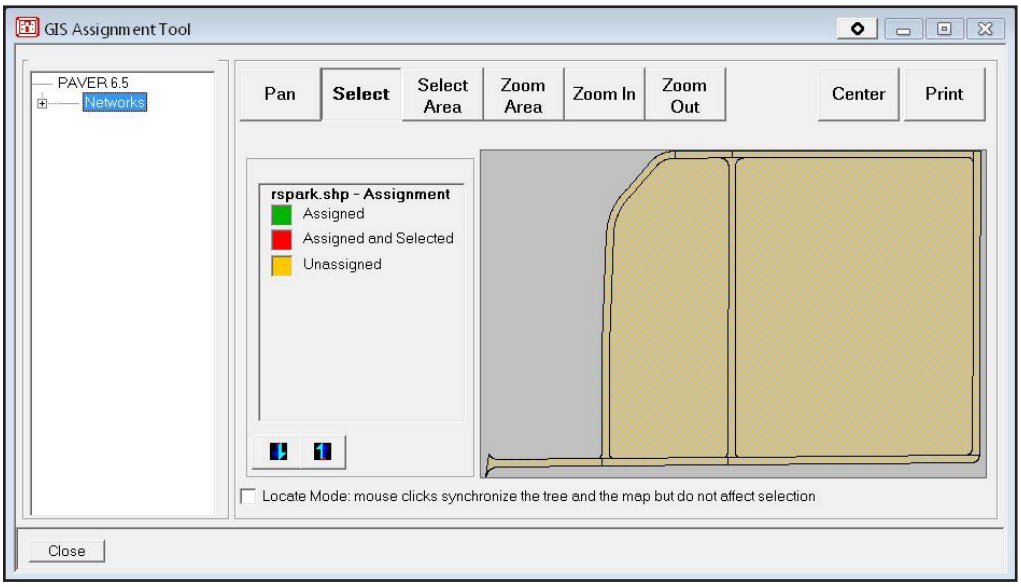
- Click on Visual menu , choose GIS tools, and highlight the PAVER GIS Assignment Tool option. Click the Continue button located at the bottom of the Visual Menu window.

GIS Assignment Tool

GIS Tools

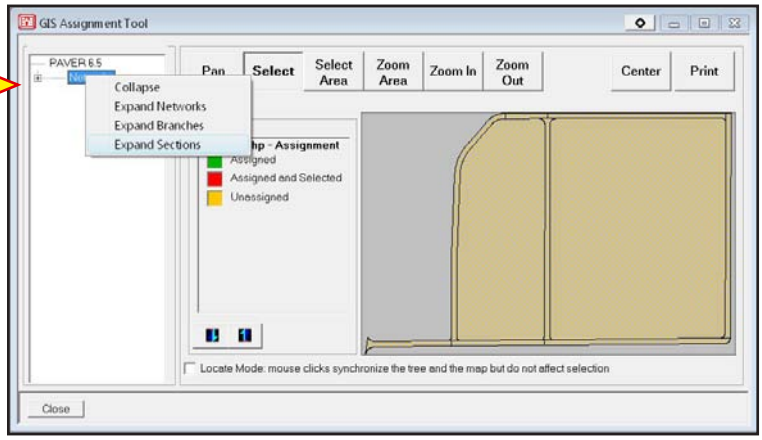


- The GIS Assignment Tool form will now open as seen below.

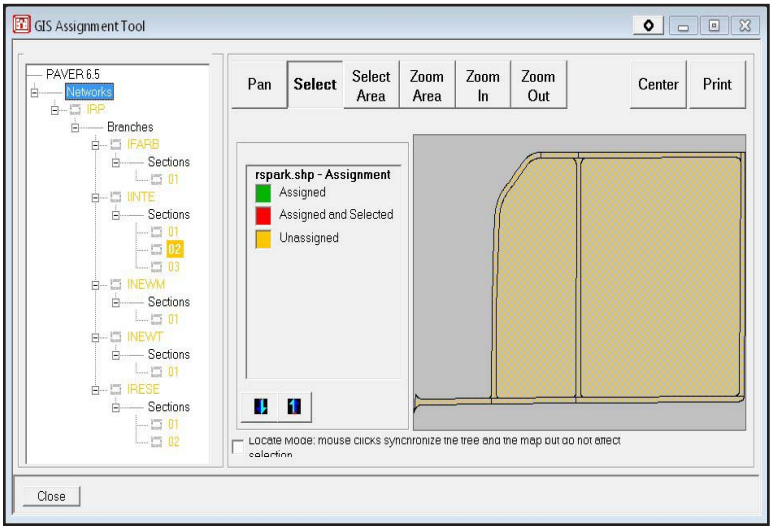


- Double click on PAVER 6.5 to reveal the Networks tree. Now right click on the Networks and select Expand Sections as seen below.

Double Click on PAVER 6.5 and then right click on Networks. Now select Expand Sections.



- Since all of the sections in the database's inventory have not been assigned to the GIS polygons, all of the sections will be colored yellow on both the tree selector and the GIS Map. This is seen in the image below.

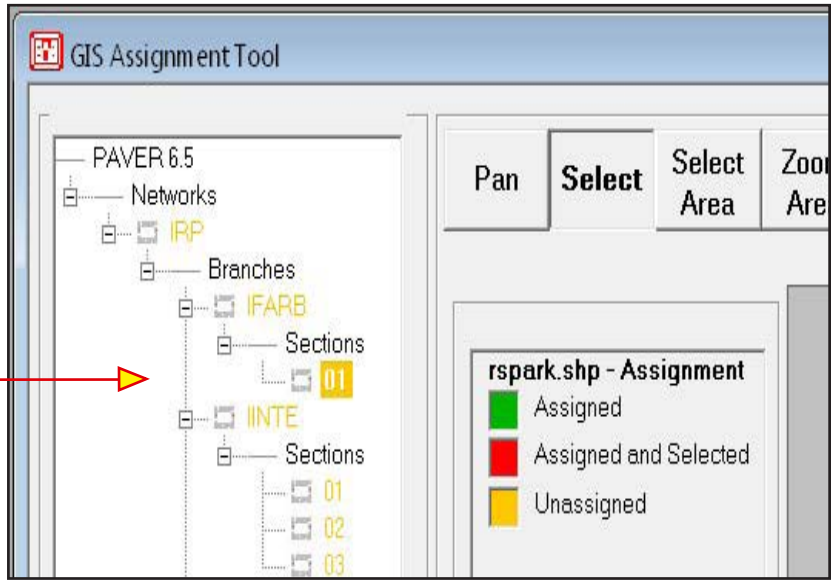


- To assign a section to a GIS polygon, click on the desired section on the tree selector and then select the associated polygon on the GIS map. This will then color the section in green on the tree selector and color the polygon in red on the GIS map, thus assigning the section. For the first example, we will assign IFARB section 01. Follow the directions below on the GIS Assignment Tool form.

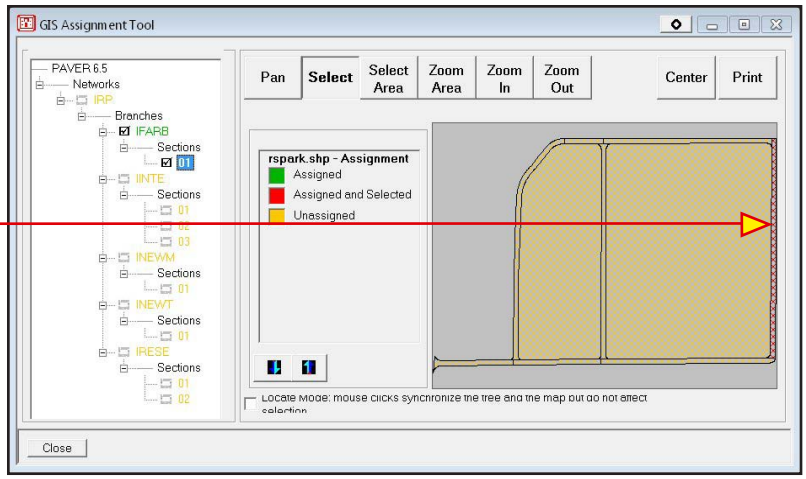
  Note: The Select tool must be active on the GIS map to select GIS polygons.

  Note: To unassign a section, first select the section on the tree selector. This will highlight the section green on the tree selector and color the associated polygon in red on the GIS map. Now, click on the assigned, red polygon on the GIS map. This will then color the polygon and the section on the tree selector yellow, thus unassigned.

Click on section 01 in the IFARB Branch.



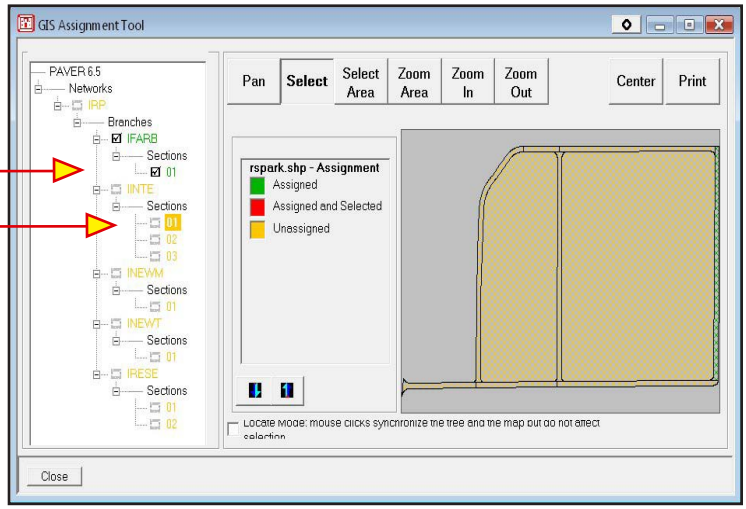
Select this polygon on the GIS map. This will assign IFARB Section 01 to this polygon.



- Now we will go through another example assigning IINTE section 01 to its associated polygon.

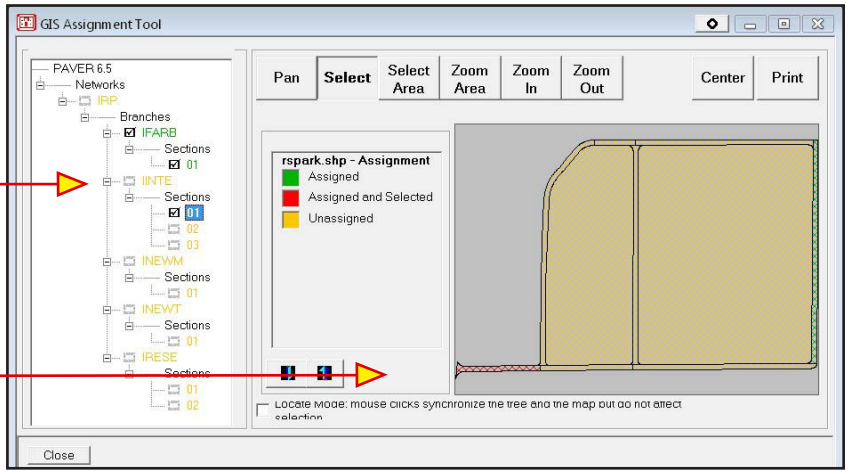
Note: The section that was just assigned remains green on the tree selector and the GIS map

Click on Section 01 in the IINTE branch.

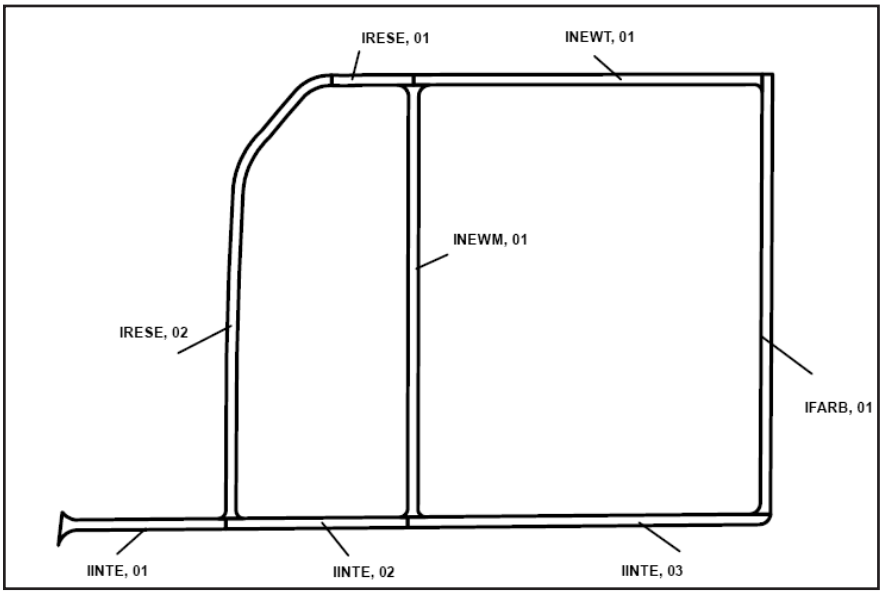


Note: The Branch root did not turn green when 01 was assigned. This is because 02 and 03 have not been assigned yet.

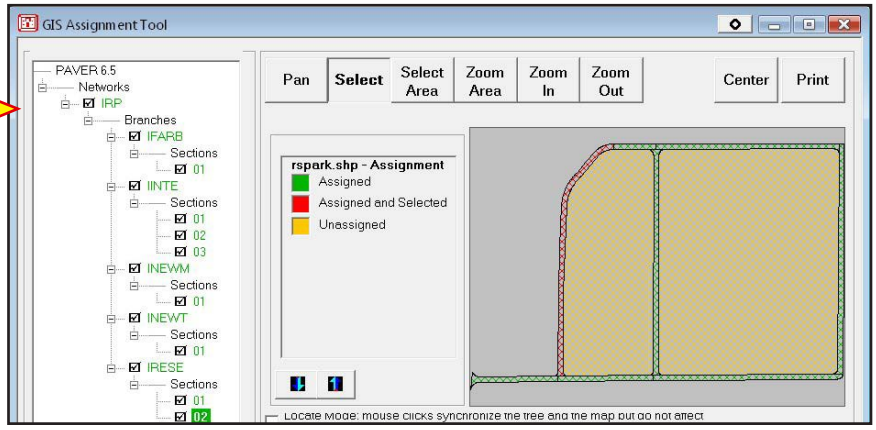
Select this polygon on the GIS map. This will assign IINTE Section 01 to this polygon.



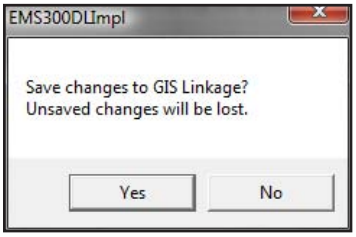
- Now assign the rest of the sections on the tree selector according to the diagram below.



All of the sections have been assigned and the network root has turned green.



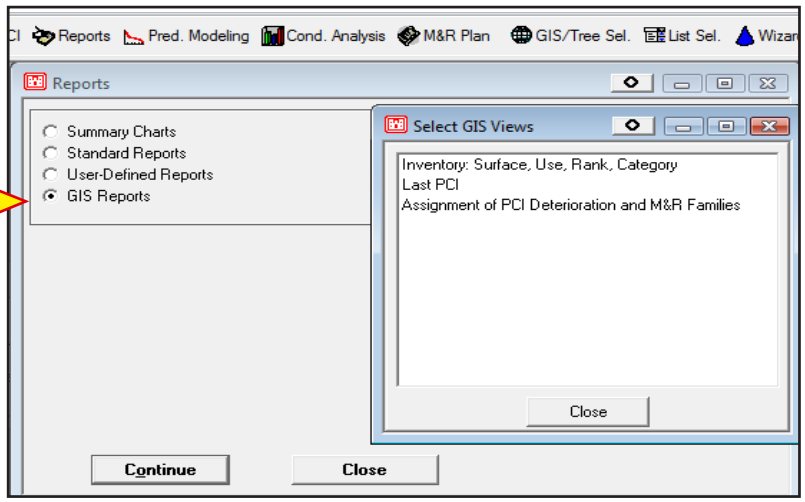
- After assigning all of the sections, click close on the bottom left of the GIS Assignment Tool. Now another form will appear asking if you would like to save your GIS Linked sections. Click Yes to save the linkage.



3. Create some GIS views that show Surface and Latest PCI.

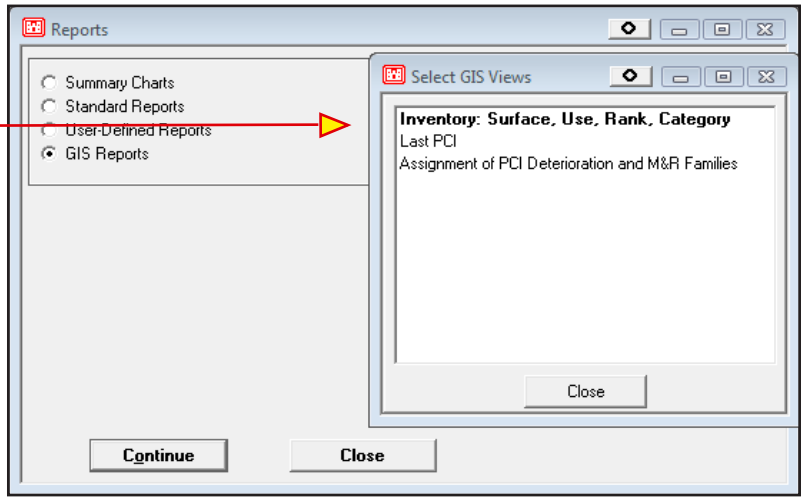
- Select Reports from the PAVER™ toolbar, then GIS Reports, and then Continue on the Reports form.

Select GIS Reports and Continue

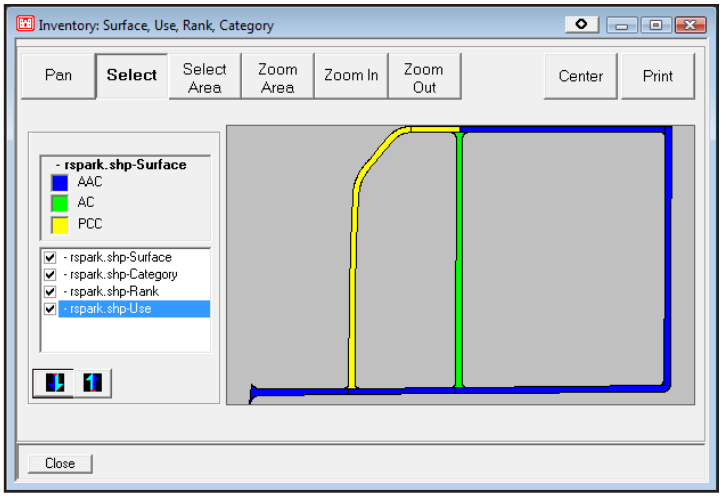


- Now, to view the Inventory GIS view, click on the Inventory: Surface, Use, Rank, Category option.

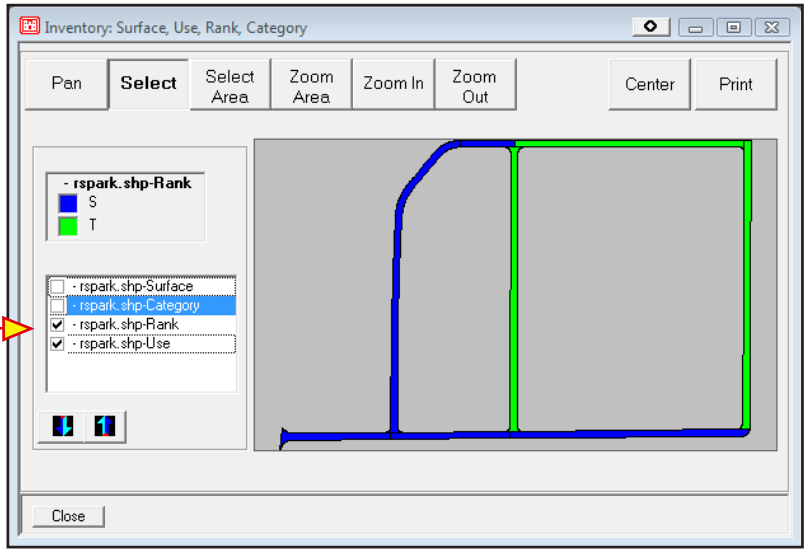
Click on Inventory: Surface, Use, Rank, Category



- On Inventory GIS view, there are several viewing options / layers checked on the lower left side of the form. As seen directly below, all of the layers are selected / on and the upper most layer that is shown is the surface layer. To toggle between these different views / layers simply check them on or off.

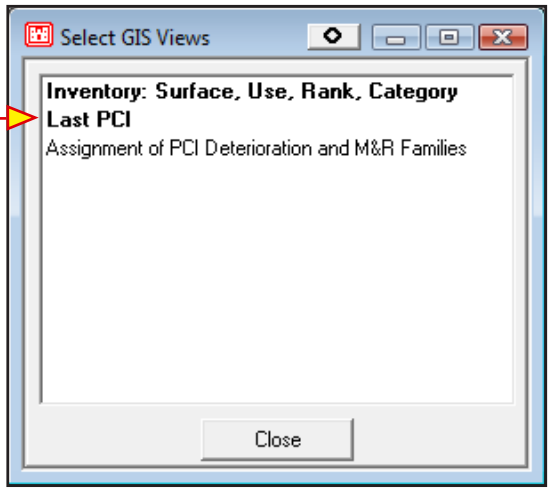


Other view / layer

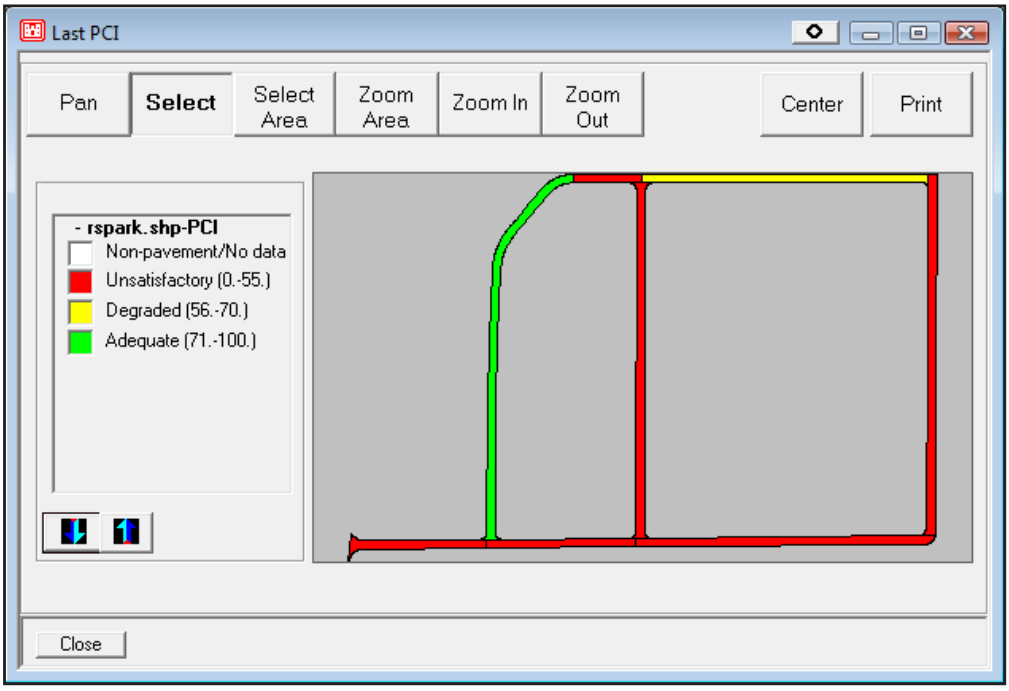


- Now, Close out of the Inventory: Surface, Use, Rank, Category GIS view and select the Last PCI GIS view option.

Select the Last PCI GIS view option



- This GIS view will display the last PCI data that was recorded/ entered in PAVER.



Workshop 5: Database Management (Import/ Export)

Objectives

Import and export a database using PAVER™ export files (*.e65).

Database

For this workshop we will be using two databases as defined below:

Tasks

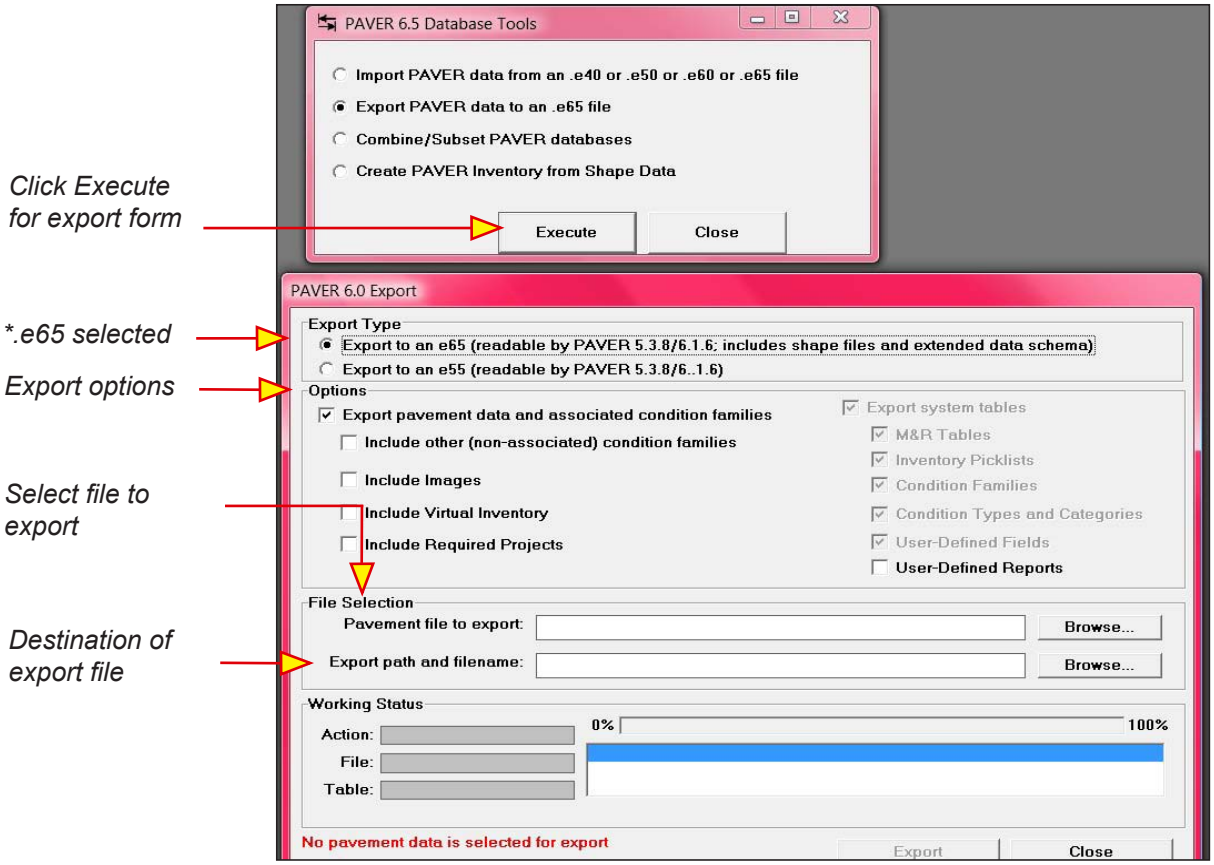
1. Export the Interstate Research Park database using the PAVER™ Import/Export Tool and name it C:\EMS Program Files\User Data\Roadway.e65.
2. Export the Neil Armstrong database using the PAVER™ Import/Export Tool and name it C:\EMS Program Files\User Data\Airport.e65.
3. Import the Roadway.e65 database using the PAVER™ Import/Export Tool and name it Roadway.
4. Import the Airport.e65 database using the PAVER™ Import/Export Tool and name it Airport.
5. Delete the Airport database.

Hints & Solution Guides For Workshop 5

1. To export pavement data to an *.e65 export file (for this example use Interstate Research Park):

   - If PAVER™ is open, close PAVER™ and open the PAVER™ 6 DB Tools icon by double-clicking it.
   - Click Export PAVER™ data to an *.e65 file, and then Execute.
   - Select the first option in the Options box, “Export pavement data and associated condition families”.

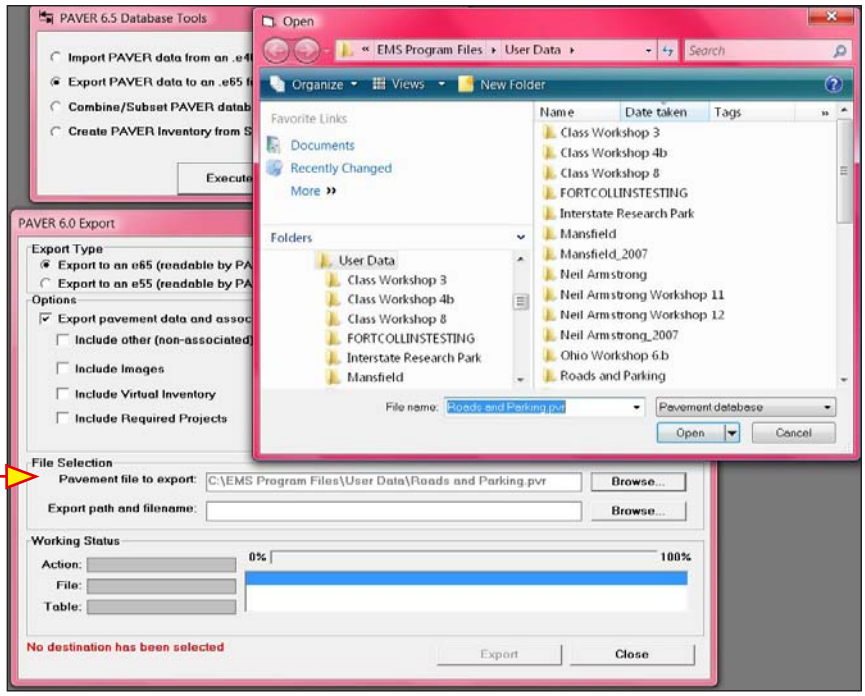
*Note: This tool can be used to make copies of the system tables for use with different databases. Also, creating an *.e65 file is the best way to back up data for archiving.*



   - In the File Selection box, click Browse next to “Pavement File to Export”, and double-click on the directory with the name of the desired database to export (navigate to C:\EMS Program Files\User Data\ and select Interstate Research Park.pvr).

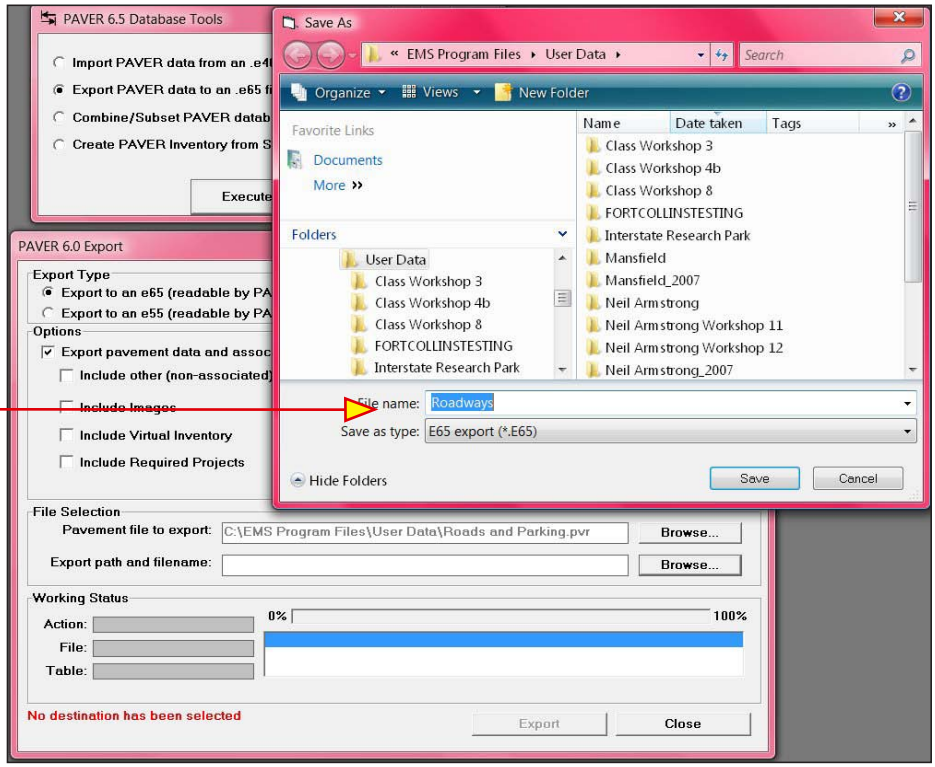
     Note: If you are exporting only system tables, the option to select the file to export is unavailable since the program already knows where the system tables are.

Selected file to export



- To change the name of the file or its destination, click Browse next to the Export Path and File Name box. For this example put the new file in the C:\EMS Program Files\User Data\ directory and name it Roadway.

Destination of export file



- Click Save and then click Export on the PAVER 6.5 “Export form”. Close the program when it is finished.

2. Using the same process as above, export the Neil Armstrong.pvr database and name it C:\EMS Program Files\User Data\Airport.e65.

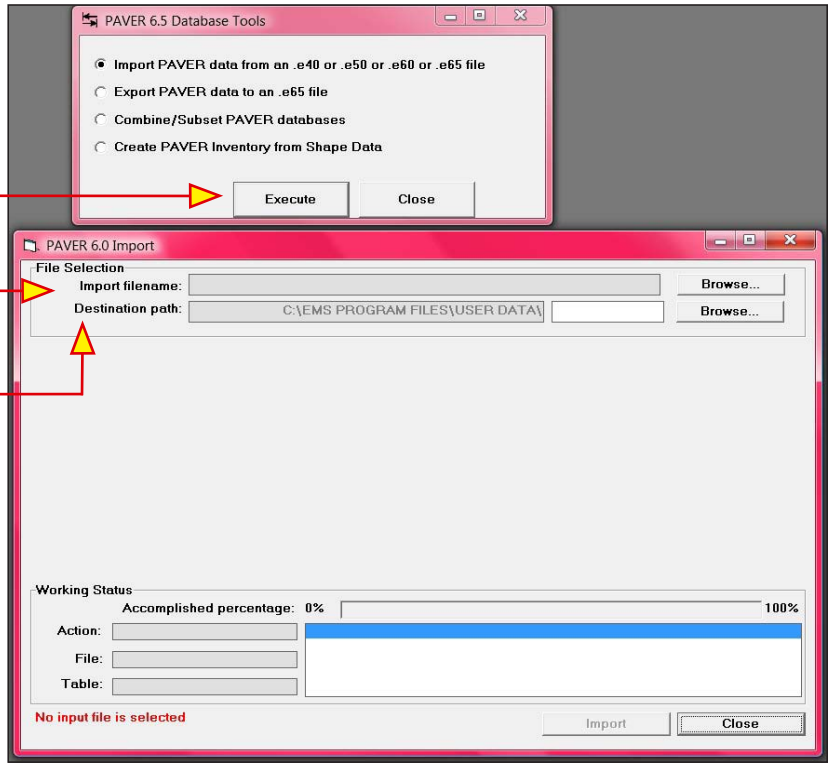
3. Importing the Roadway.e65 file into PAVER™:

   - Close PAVER™ if it is opened as the import/export tools will not run if PAVER™ is currently running.
   - Double-click the PAVER™ 6 DB Tools icon, and then select Import data from an *.e65 file and Execute.

Click Execute for import form

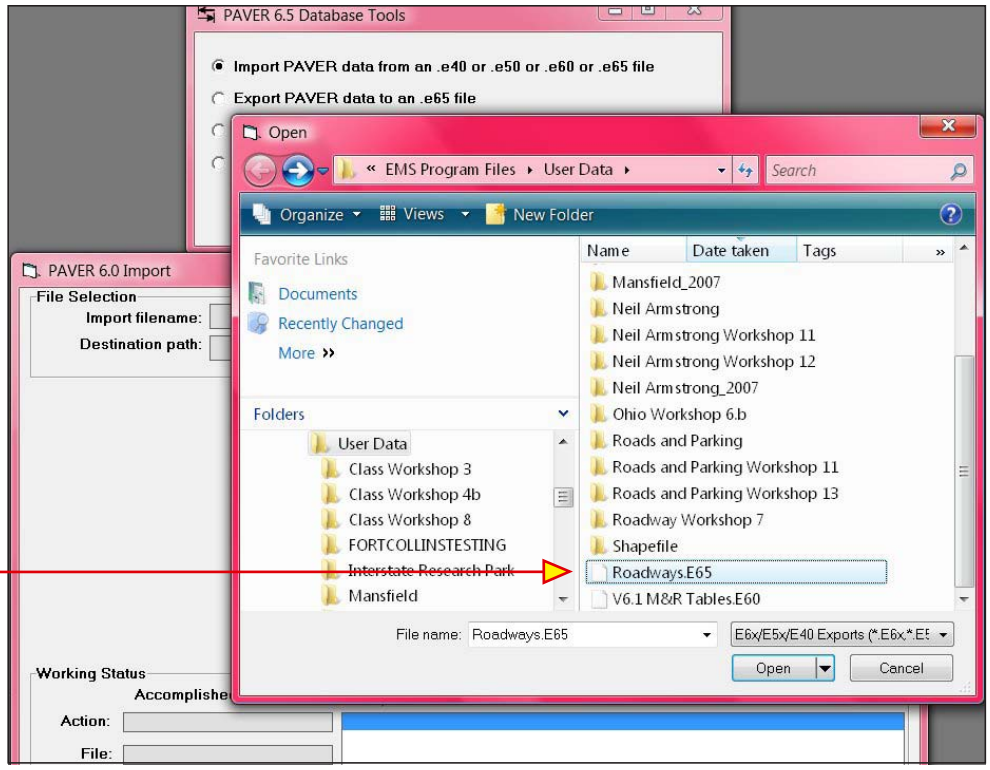
Import file selection

Destination of import file



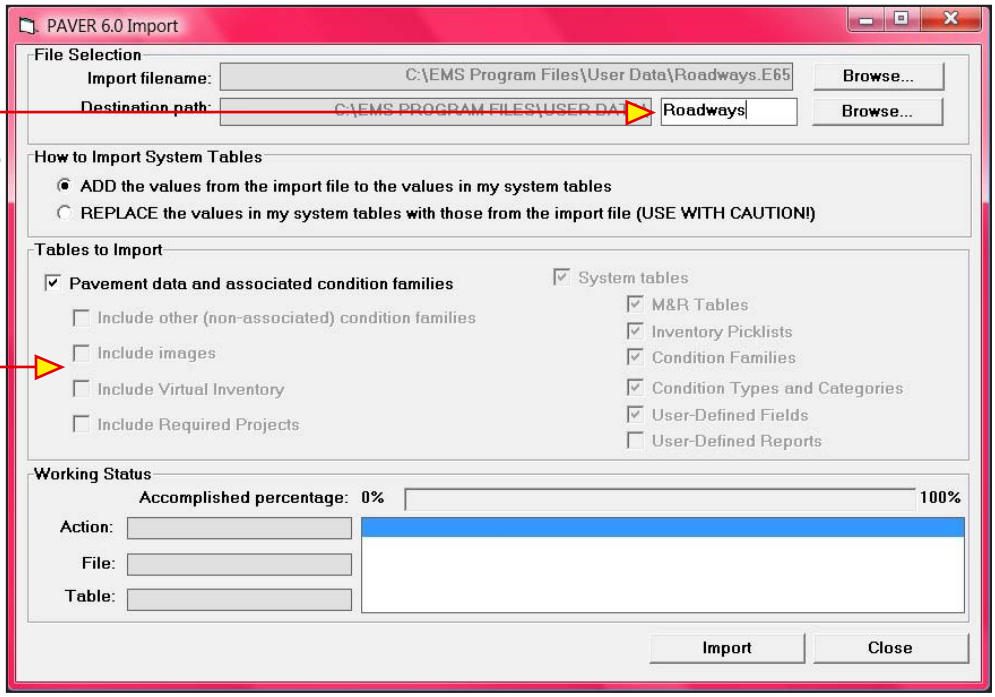
   - Click Browse next to the "Import Filename". Navigate to the file Roadway.e65 in C:\EMS Program Files\User Data.

Select file to import

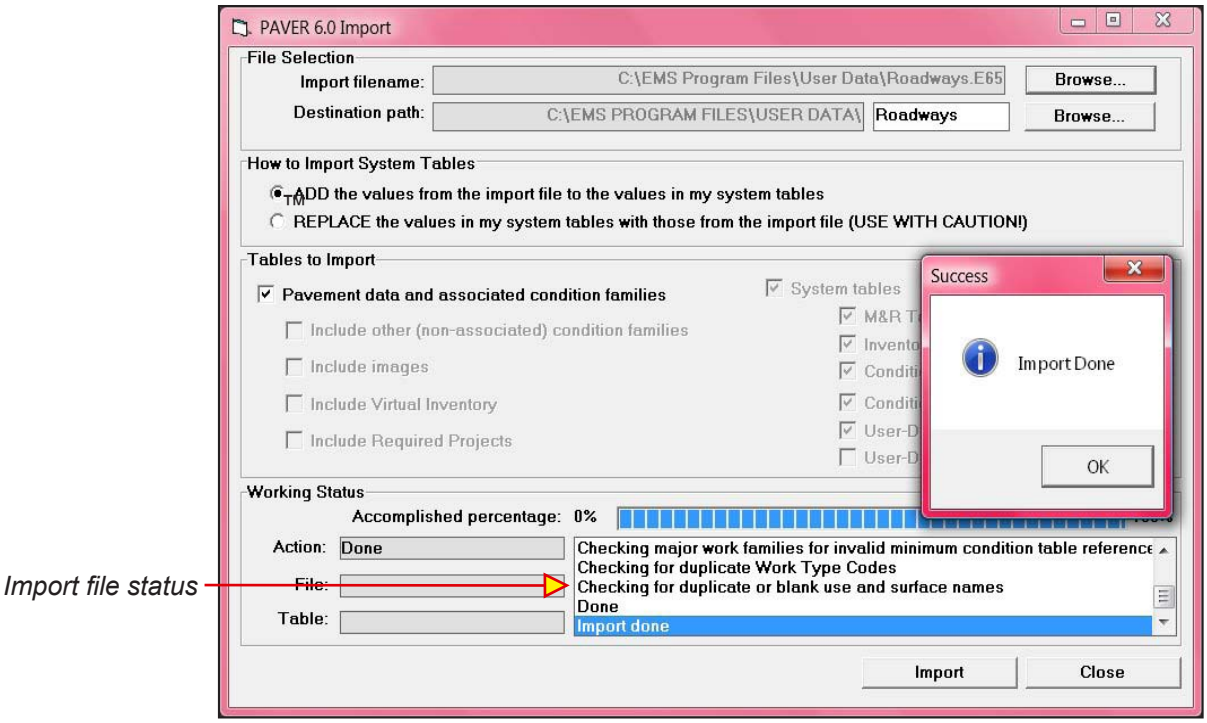


File being imported. Change file name to Roadway, As seen

Import file options



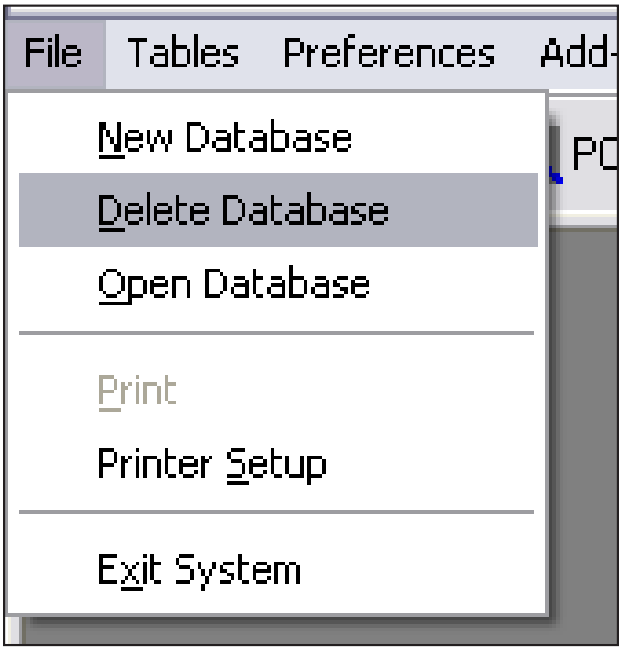
- When you select the file and click OK, a default name for the database will appear in the box on the Destination Path line. Here you can change the name of the database. You can also change the location of the imported database by clicking Browse next to the Import Path line.



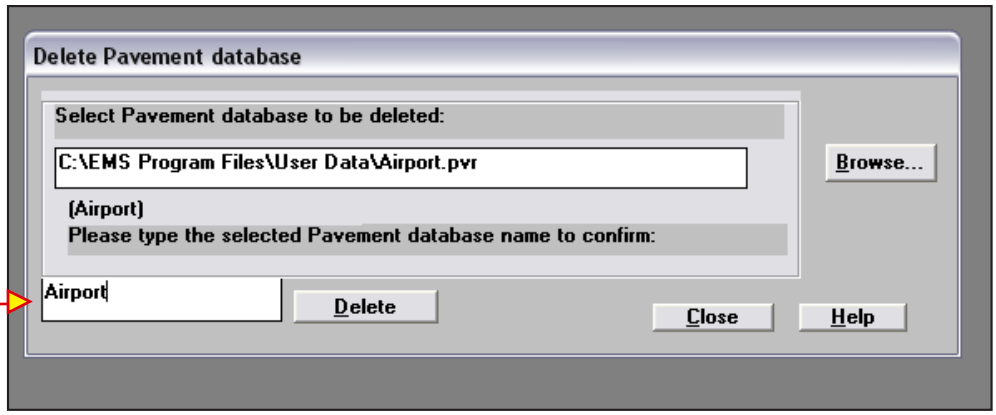
Import file status

4. Using the same process as above, import the Airport.e65 file into PAVER. Name the database Airport.

5. Open PAVER and follow the captions below to delete the Airport database.



Select the Airport Database to delete and confirm



Workshop 6.a.: Database Management (Combine)

Objective

Combine several databases using the Combine/ Subset database tool.

Database

Use the two databases as defined below:

Task

1. Combine the Neil Armstrong and Mansfield databases using the Combine/ Subset database tool, and name the new database Ohio.

Hints & Solution Guide For Workshop 6.a.

1. Using the Database Combine/ Subset tool:

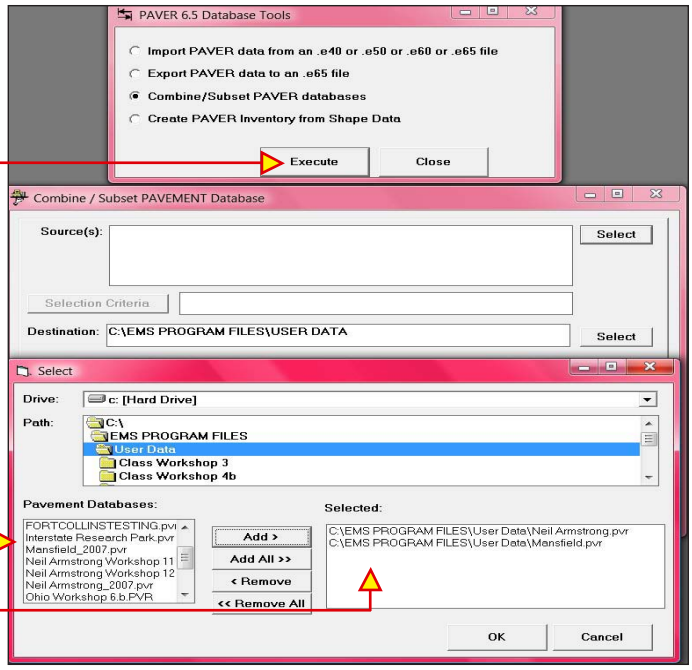
   - To combine databases, or to subset a database, double-click the PAVER™ 6 DB Tools icon. Select Database Tools and choose Combine/ Subset Database from the window on the right, and then Execute.

   - First, choose the source data by clicking Select next to the Source box and then choose the location of the database(s) you want to use. A list of available data is on the left. Select the data you want by clicking the database and using Add to move it to the right. Alternately, you can simply double-click the database and it will move to the right. Click OK when you are finished, and the source box will now show what source database(s) you selected.

Click Execute for Combine/ Subset form

Pavement files to choose from

Files selected to combine

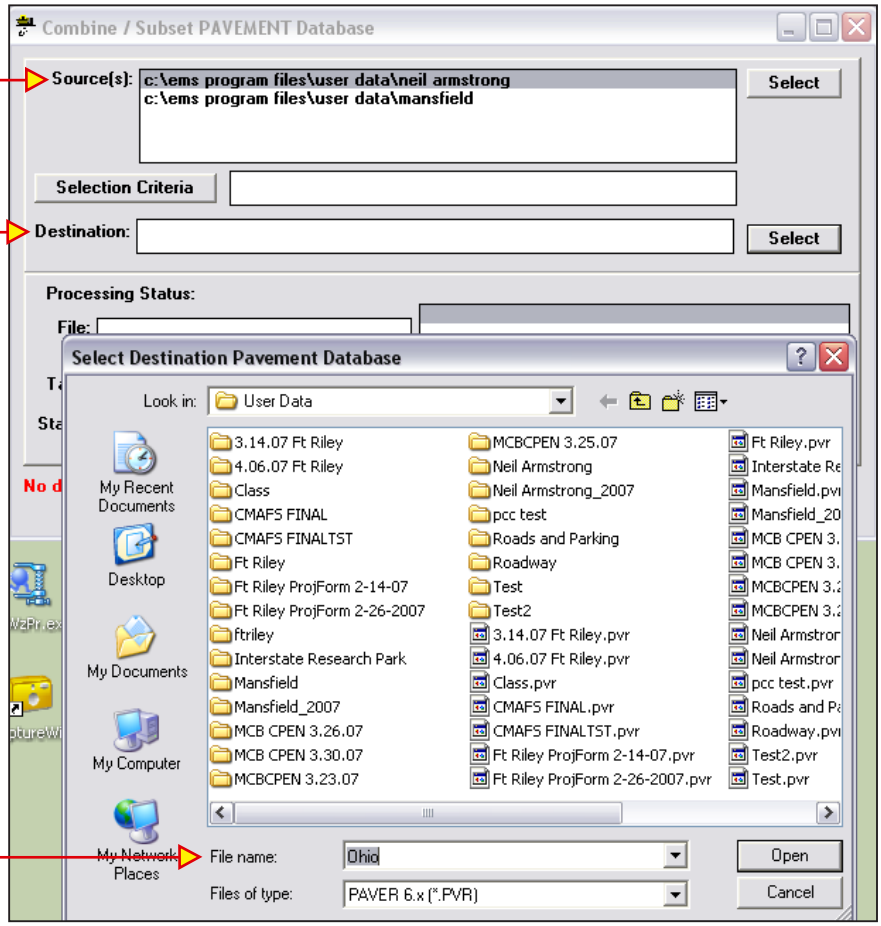


- Choose the destination or the new database that you will create from the source data by clicking Select next to the Destination box. A dialog box will appear that allows you to type in a name for the new database and choose its new location. Make sure that the newly created database is located in the directory C:\EMS Program Files\User Data. Select Open and then Yes to create the newly named file

Selected files to combine

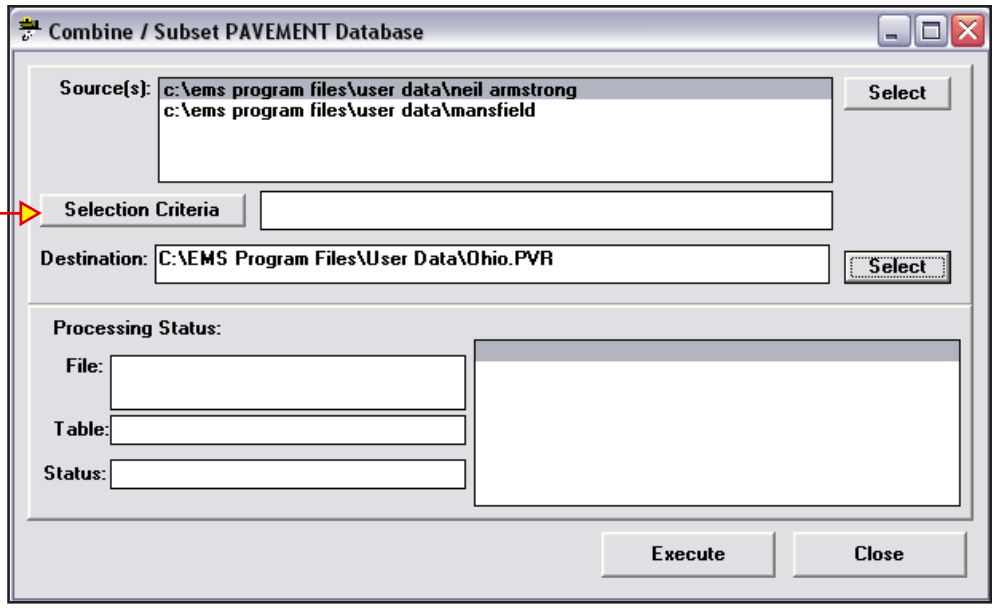
Destination of combined files

Select a destination for combined files, or enter a new file name



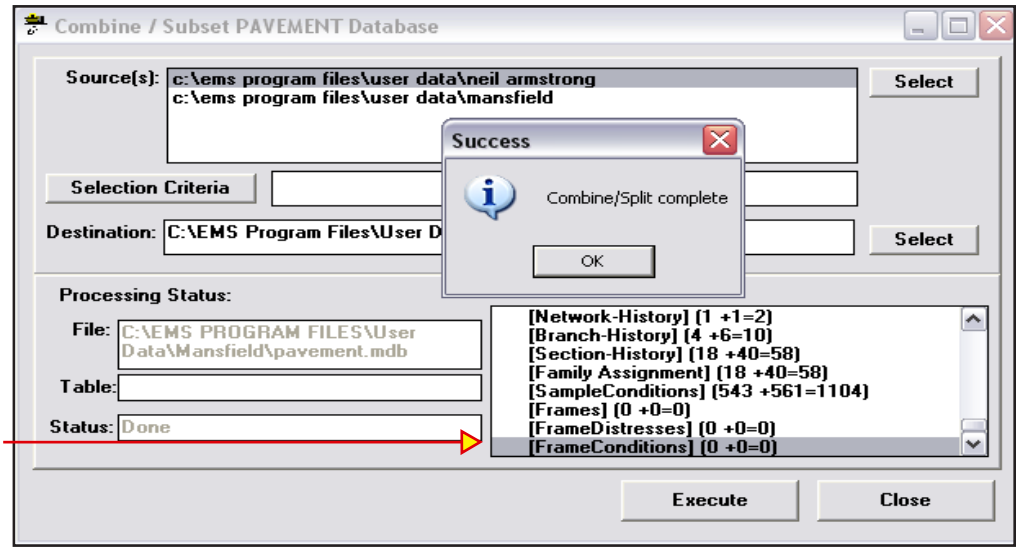
- You can filter the information that goes into the new database, which is useful for combining parts of multiple databases together or separating a single database into several parts. Click Selection Criteria and the EMS Query Tool launches, allowing you to create a query. For this example, we will combine both of the databases in whole, thus the query tool is not needed.

Query tool



- Click on the Execute tool to combine both of the databases.

Status of combination



Workshop 6.b.: Database Management (Subset)

Objective

Subset a database using the Combine/Subset Database tool.

Database

For this lesson we will be using the Ohio Workshop 6.b database.

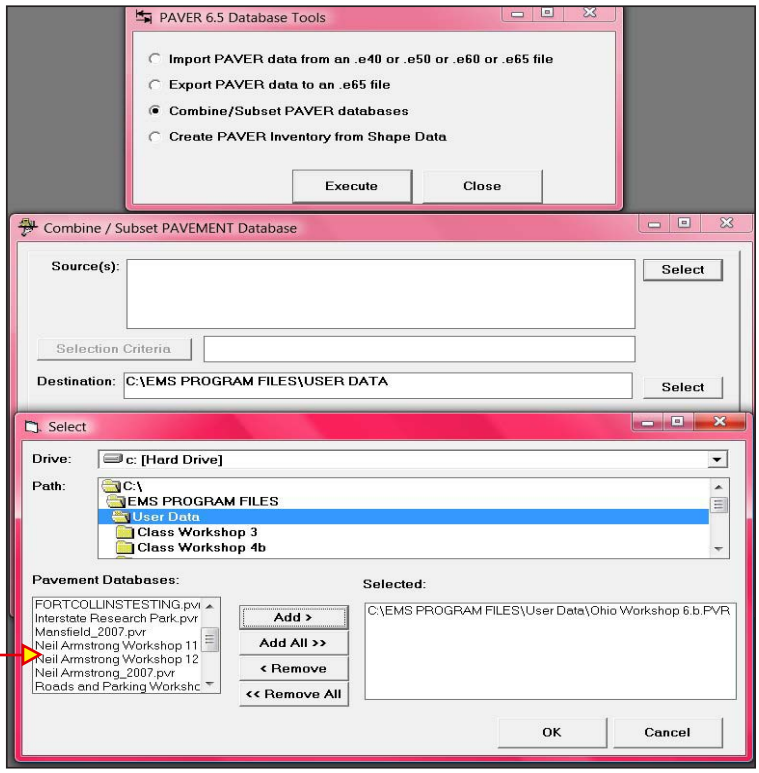
Task

1. Create a new database containing only Ohio Workshop 6.b runways, and name it Ohio Runways.

Hints & Solution Guide For Workshop 6.b.

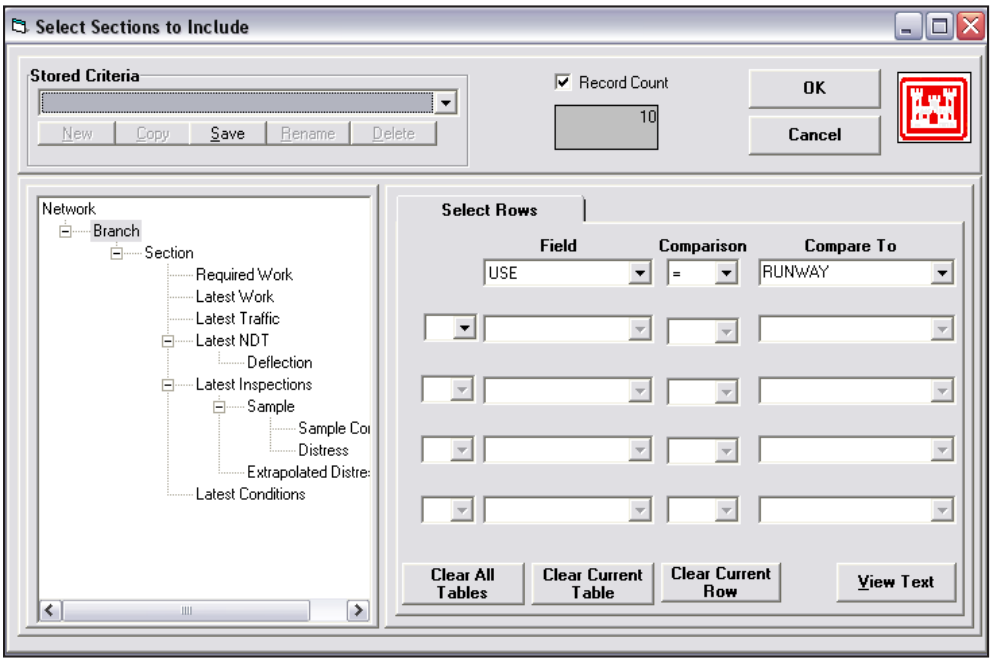
1. To subset a single database into parts:

   - Double-click on the PAVER™ 6 DB Tools icon and select Combine/Subset PAVER™ Databases.
   - Click Select next to the Source box and highlight the desired database (Ohio Workshop 6b) in the Pavement Databases drop-down list. Select Add to move the Ohio Workshop 6b to the Selected pavement databases box, this is seen below.

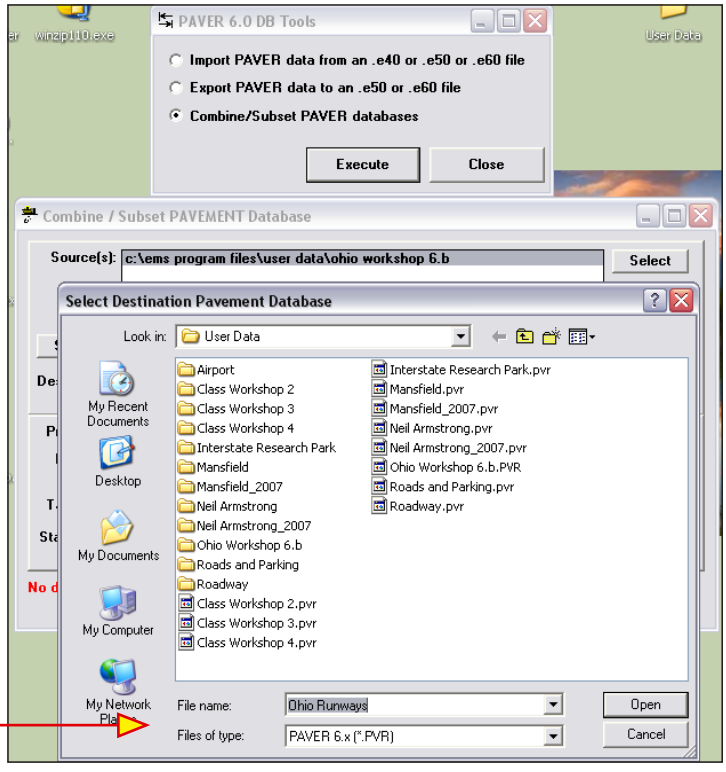


Select Databases to Combine/ Split, Ohio Workshop 6b

- Click Selection Criteria and create the query as seen below.

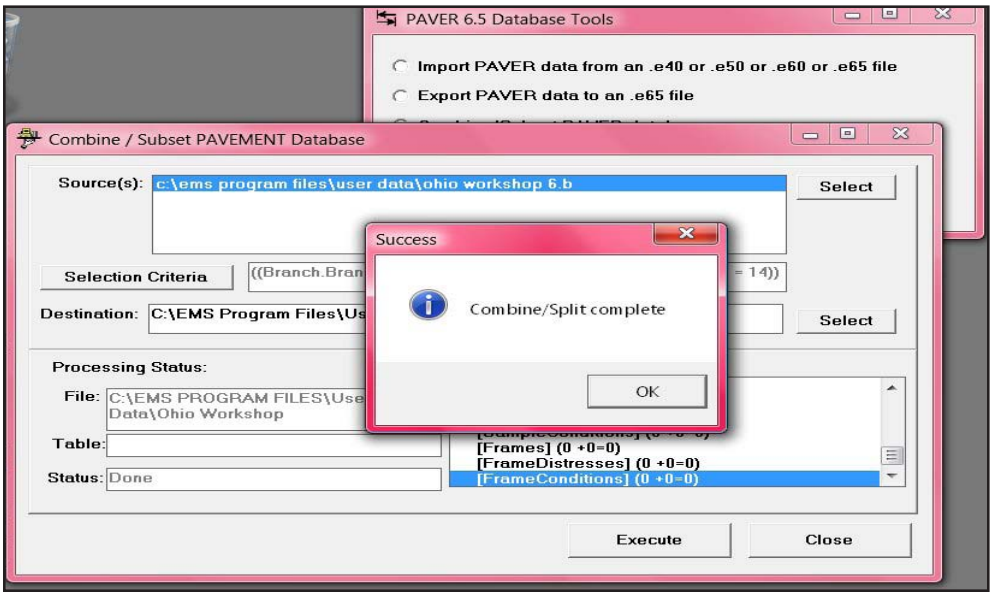


- Click Select next to the Destination box and type the name of the new database (Ohio Runways). Then click Open followed by a Yes to create the file.



New database name and destination

- Click OK to close the EMS Query Tool and Execute to Subset the database.



Workshop 7: Database Verification Tools

Objective

Run the database verification tool.

Database

Open the Roadway Workshop 7 database by clicking File >> Open Database, selecting Roadway Workshop 7.pvr and clicking Open.

Task

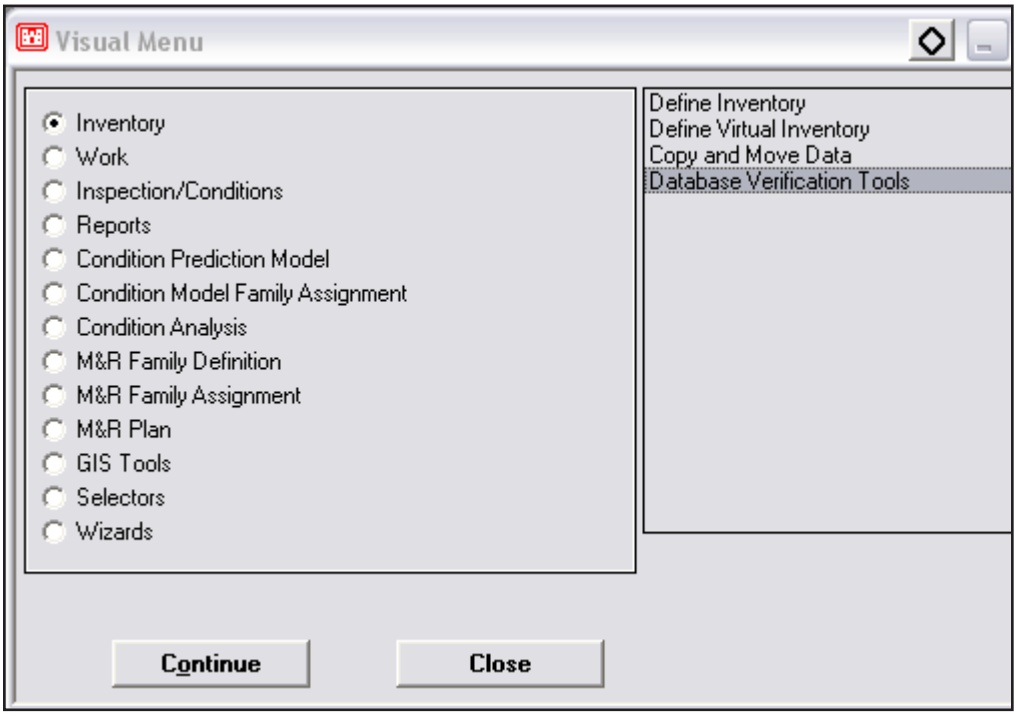
1. Run the database verification tool on the Roadway Workshop 7 database.

Hints & Solution Guide For Workshop 7

1. Using the Database Verification Tool

- To run the database verification tool, open the desired database (Roadway Workshop 7.pvr).
- Select Visual Menu from the PAVER™ button bar.

- Click Inventory on the left-hand side, and then Data Verification Tools and Continue.

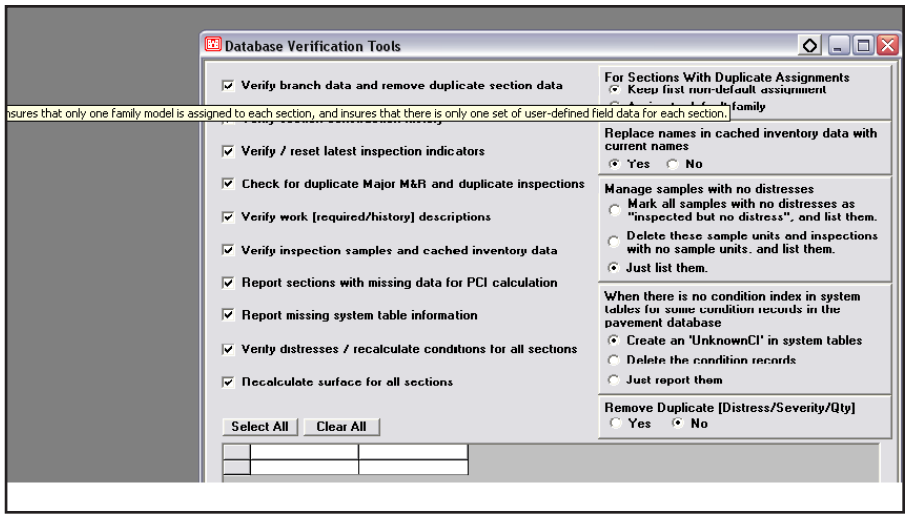


- When the Confirm Database Verification Startup box appears click Yes.

Note: It is highly recommended that you make a copy (.e65 file) of your database before running the database verification tools.*

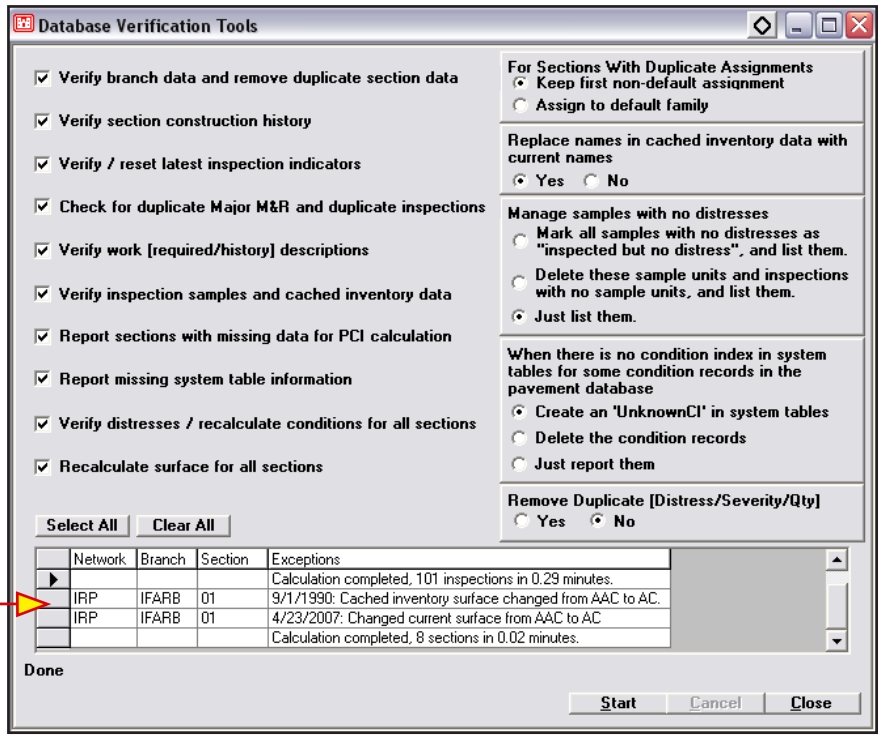
- Review the Verification Tools by moving your cursor over the verification options on the left.

Verification Tools explanation


Database Verification Tools
Verify branch data and remove duplicate section data
Verify / reset latest inspection indicators
Check for duplicate Major M&R and duplicate inspections
Verify work [required/history] descriptions
Verify inspection samples and cached inventory data
Report sections with missing data for PCI calculation
Report missing system table information
Verify distresses / recalculate conditions for all sections
Recalculate surface for all sections
Select All
Clear All
For Sections With Duplicate Assignments
Keep first non-default assignment
Replace names in cached inventory data with current names
Yes
No
Manage samples with no distresses
Mark all samples with no distresses as "inspected but no distress", and list them.
Delete these sample units and inspections with no sample units, and list them.
Just list them.
When there is no condition index in system tables for some condition records in the pavement database
Create an 'UnknownCI' in system tables
Delete the condition records
Just report them
Remove Duplicate [Distress/Severity/Qty]
Yes
No

- Select all the boxes and then click Start.

Status of Verification Tools


Database Verification Tools
Verify branch data and remove duplicate section data
Verify section construction history
Verify / reset latest inspection indicators
Check for duplicate Major M&R and duplicate inspections
Verify work [required/history] descriptions
Verify inspection samples and cached inventory data
Report sections with missing data for PCI calculation
Report missing system table information
Verify distresses / recalculate conditions for all sections
Recalculate surface for all sections
Select All
Clear All
For Sections With Duplicate Assignments
Keep first non-default assignment
Assign to default family
Replace names in cached inventory data with current names
Yes
No
Manage samples with no distresses
Mark all samples with no distresses as "inspected but no distress", and list them.
Delete these sample units and inspections with no sample units, and list them.
Just list them.
When there is no condition index in system tables for some condition records in the pavement database
Create an 'UnknownCI' in system tables
Delete the condition records
Just report them
Remove Duplicate [Distress/Severity/Qty]
Yes
No
Network
Branch
Section
Exceptions
Calculation completed, 101 inspections in 0.29 minutes.
IRP
IFARB
01
9/1/1990: Cached inventory surface changed from AAC to AC.
IRP
IFARB
01
4/23/2007: Changed current surface from AAC to AC
Calculation completed, 8 sections in 0.02 minutes.
Done
Start
Cancel
Close

Workshop 8: Review - Creation Of Additional User-defined Fields

Objectives

Create an additional user-defined field at the network level which displays the network's elevation.

Database

Open the Class database by clicking File >> Open Database, selecting Class Workshop 8.pvr and clicking Open.

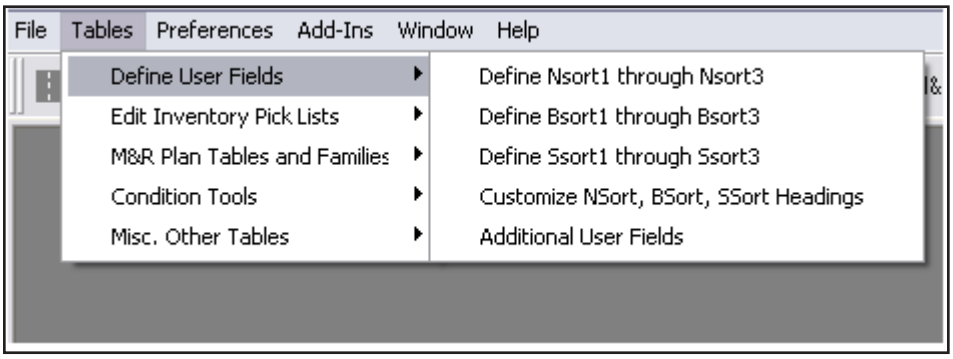
Tasks

1. At the network level, create an additional user-defined field to display the network's elevation.

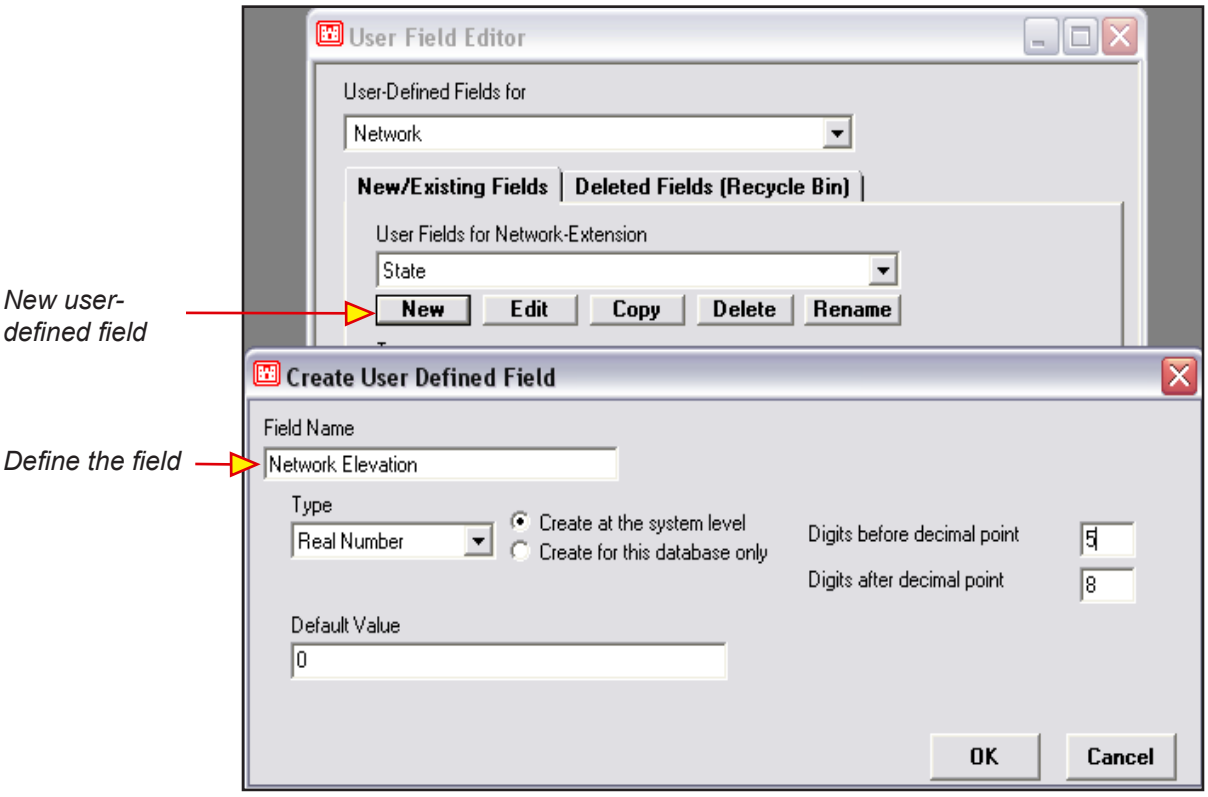
Hints & Solution Guide For Workshop 8

1. How to create the network level user-defined field:

   - Create an additional user field by selecting Tables >> Define User Fields >> Additional User Fields.

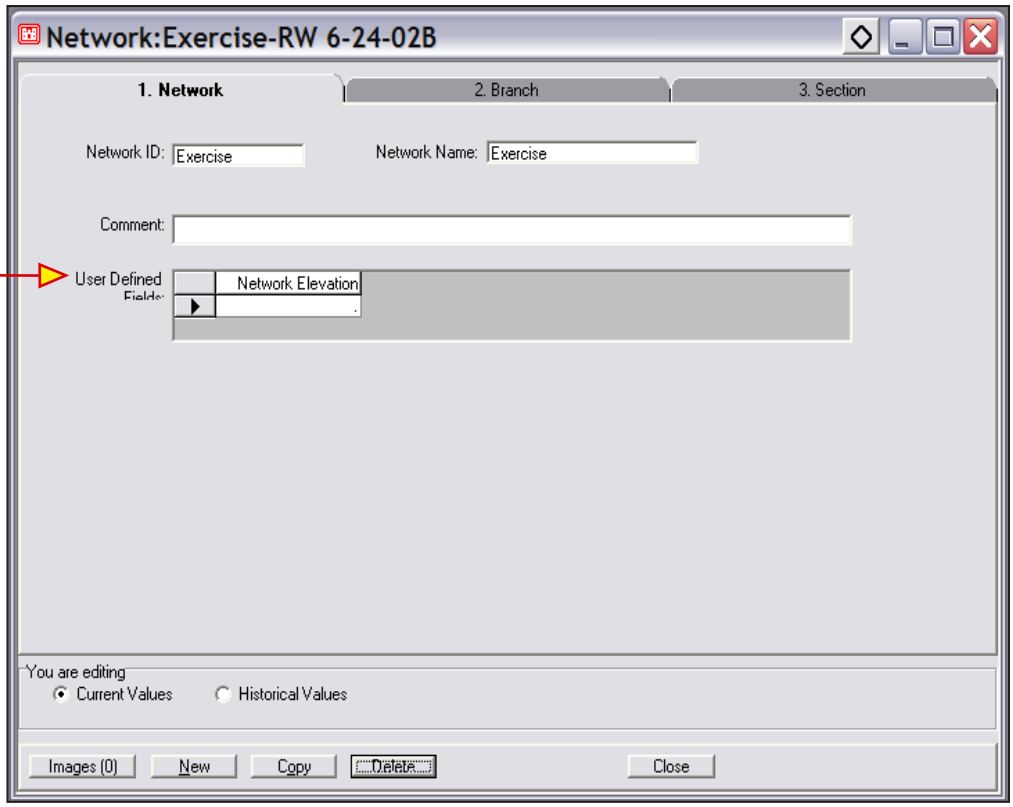


   - In the Edit User-defined Fields box, select Network and then click New.
   - For the Field Name enter Network Elevation, for Type select Real Number from the drop-down menu and then click OK. You can then close the User Field Editor form.



   - Verify that the User-defined Fields were created properly by opening the Inventory module.

New field


Network:Exercise-RW 6-24-02B
1. Network
2. Branch
3. Section
Network ID: Exercise
Network Name: Exercise
Comment:
User Defined Fields:
Network Elevation
You are editing
Current Values
Historical Values
Images (0)
New
Copy
Delete
Close

Workshop 9.a.: Creation Of A New Surface Type

Objectives

Create a new surface type for PCC over PCC surfaces and call it PPC.

Database

For this workshop you may choose to use your choice of a database.

Note: The creation of a new surface type is done at the section level, therefore it does not matter which database you use.

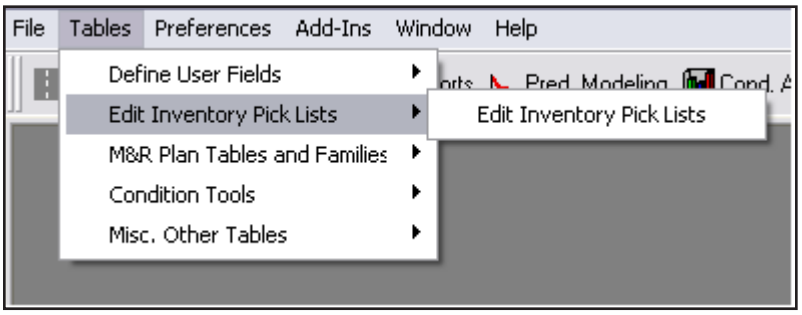
Tasks

1. Create a new surface type.

Hints & Solution Guide For Workshop 9.a.

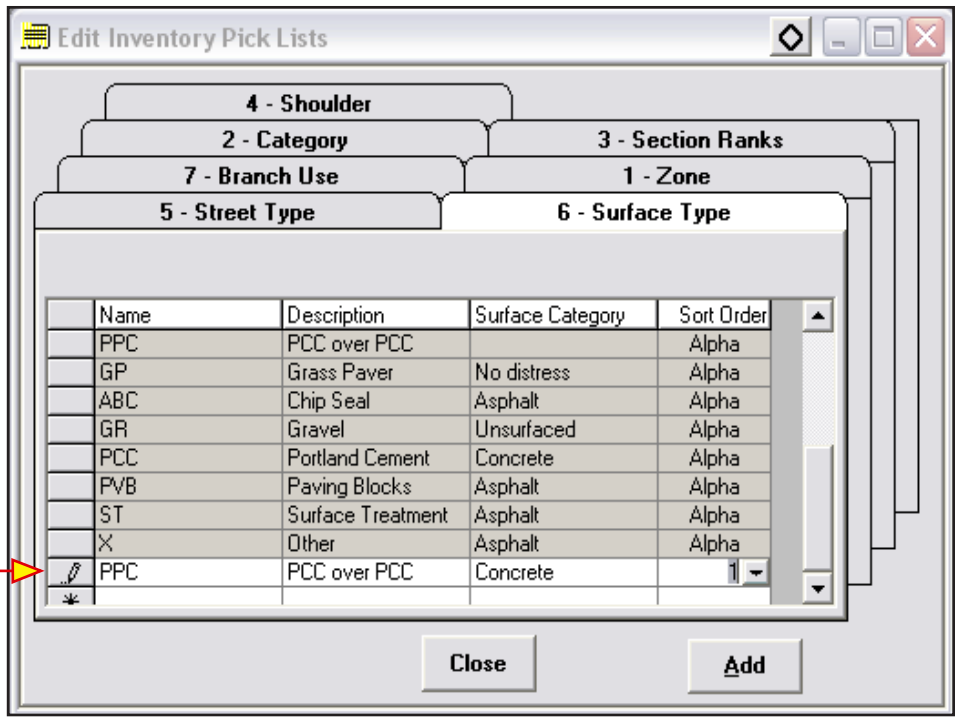
1. Create a new surface type:

- Select the Surface Type table by clicking on Tables >> Edit Inventory Pick Lists >> Edit Inventory Pick Lists.



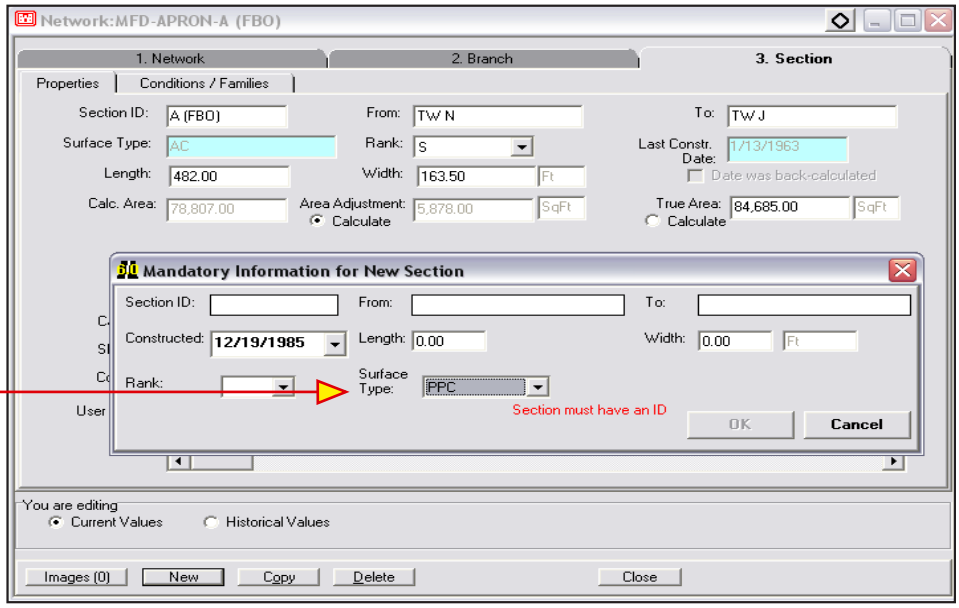
- Click on tab "6 – Surface Type" and select Add. This will allow you to add a new surface type in the last row of the table as seen below.
  - Name = PPC
  - Description = PCC over PCC
  - Surface Category = Concrete
  - Sort Order = 1

Name and define new surface type



- To verify that the new surface has been added, open the Inventory module and try to create a new section using the new surface type, PPC.

Newly defined surface type



Workshop 9.b.: Creation Of A New Branch Use

Objectives

Create a new branch use of Warehouse.

Database

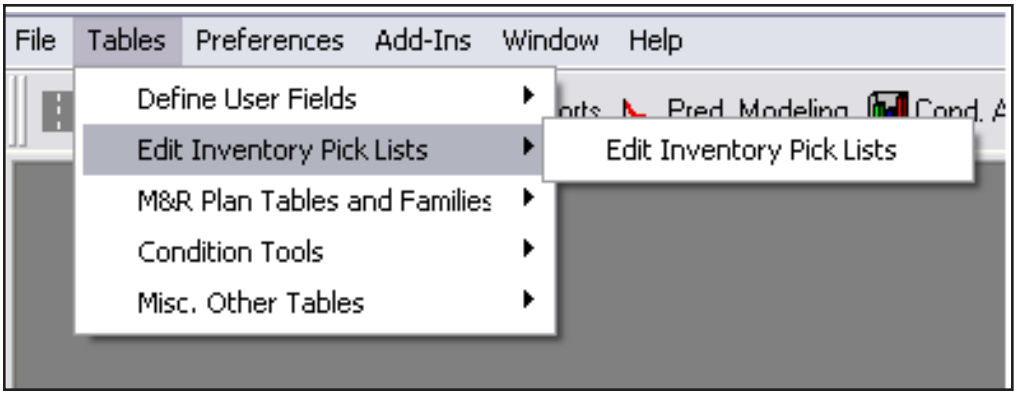
For this workshop you may choose to use your choice of a database.

Note: The creation of a new branch use is done at the branch level, therefore it does not matter which database you use.

Tasks

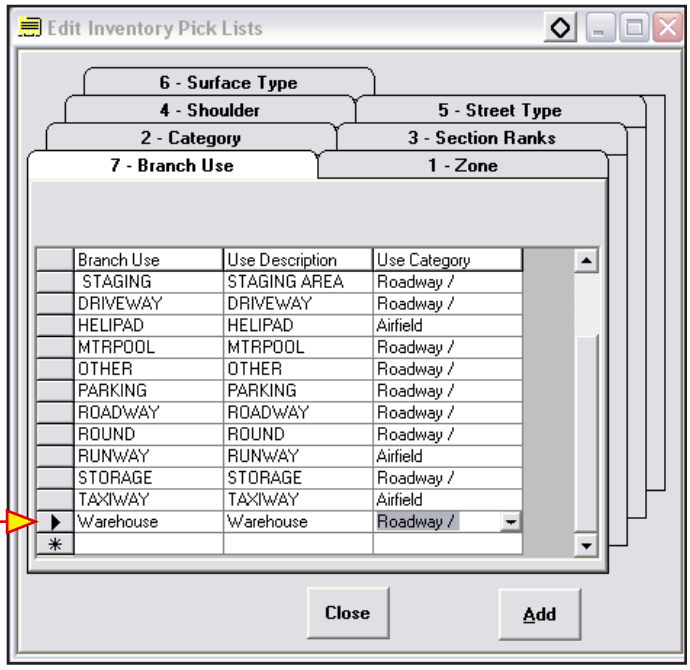
1. Create a new branch use.

- Select the Branch Use table by clicking on Tables >> Edit Inventory Pick Lists >> Edit Inventory Pick Lists.



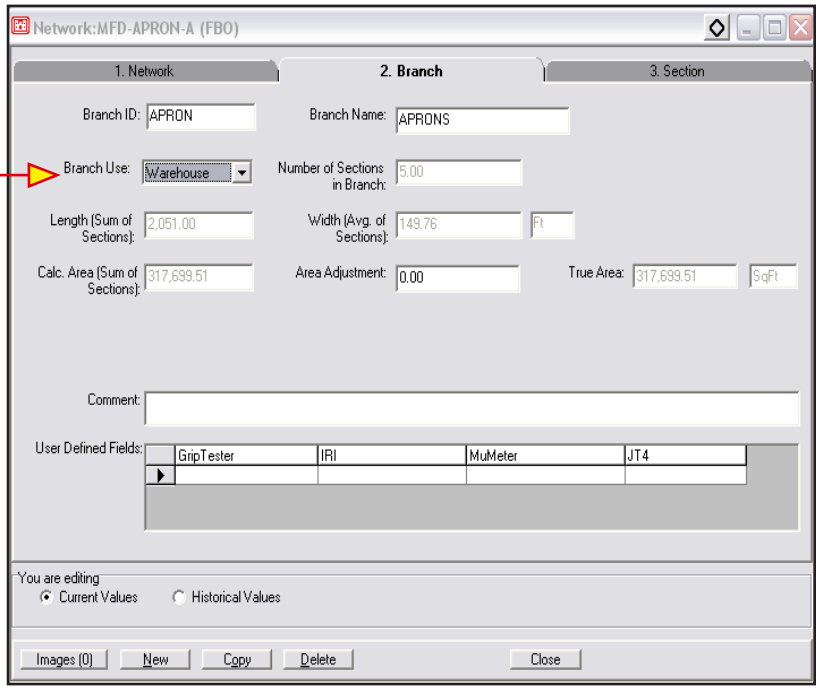
- Click on tab 7 – Branch Use.
- Add a new branch use in the last row of the table as seen below.
  - Branch Use = Warehouse
  - Use Description = Warehouse
  - Use Category = Roadway/ Parking

Define and name new branch use



- The new branch use, Warehouse, can now be defined in the Inventory module on the Branch tab.

Newly defined branch use



Workshop 10: Wizards

Objectives

Learn to use each of the wizards.

Database

Neil Armstrong and Interstate Research Parkway.

Tasks

1. Inspection Setup Wizard: Create Inspection Records, Inspection Forms, and Reinspection Reports for all runways, using the Neil Armstrong database.
2. Work Entry Wizard: Enter a slurry seal on 6/15/ 2006, on all AC Taxiways, using the Neil Armstrong database.
3. Calculate Last Construction Date Wizard: Calculate the last construction date for all Aprons, using the Neil Armstrong database.
4. Set Properties On Multiple Inventory Items Wizard: In Interstate Research Parkway database, populate the number of lanes with 3 for all of Interstate drive, and the remaining streets with 2 lanes.

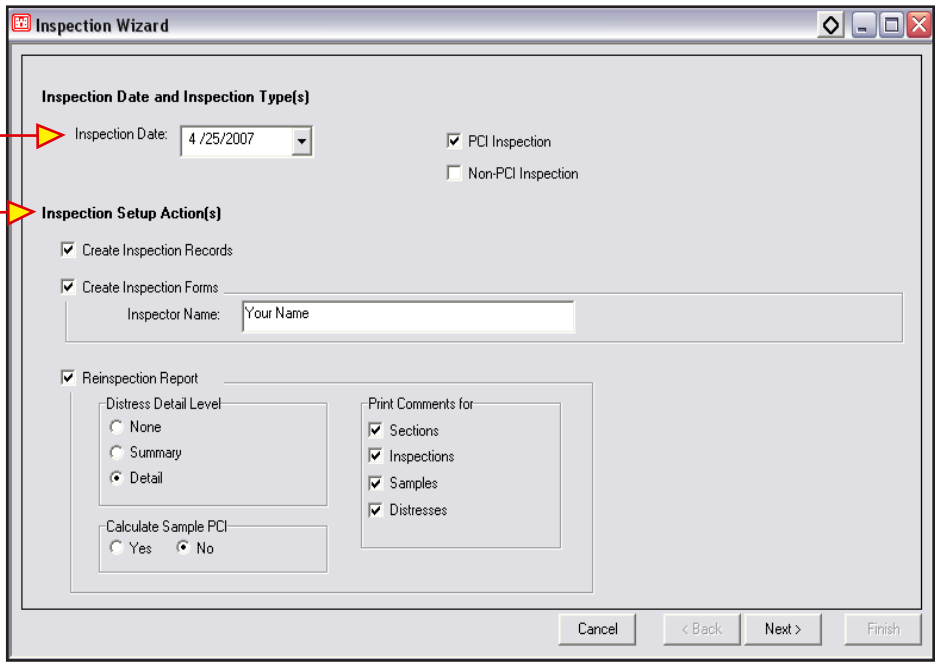
1. Inspection Setup Wizard (Neil Armstrong database):

- Using the Neil Armstrong database, open the Inspection Setup wizard via the Wizard icon on the PAVER™ toolbar.

- Select the Inspection Setup wizard and then set today as the Inspection Date and leave the Inspection Type as PCI Inspection. Select all three Inspection Setup Actions.

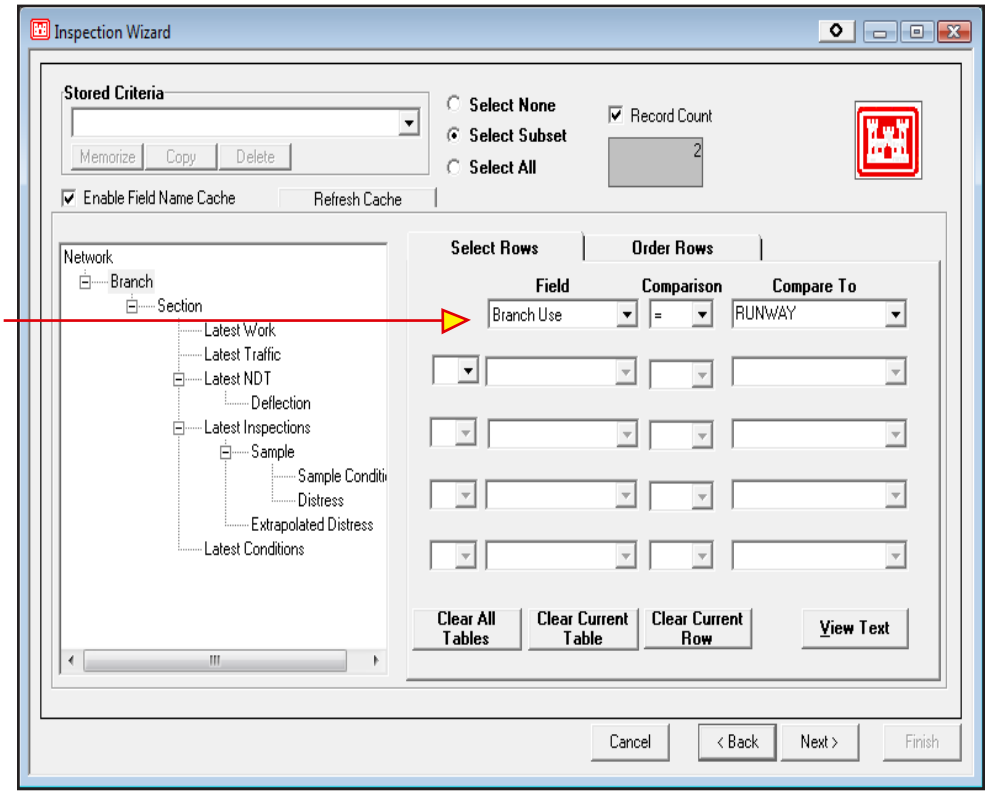
Set today as the inspection date

Select setup actions as shown

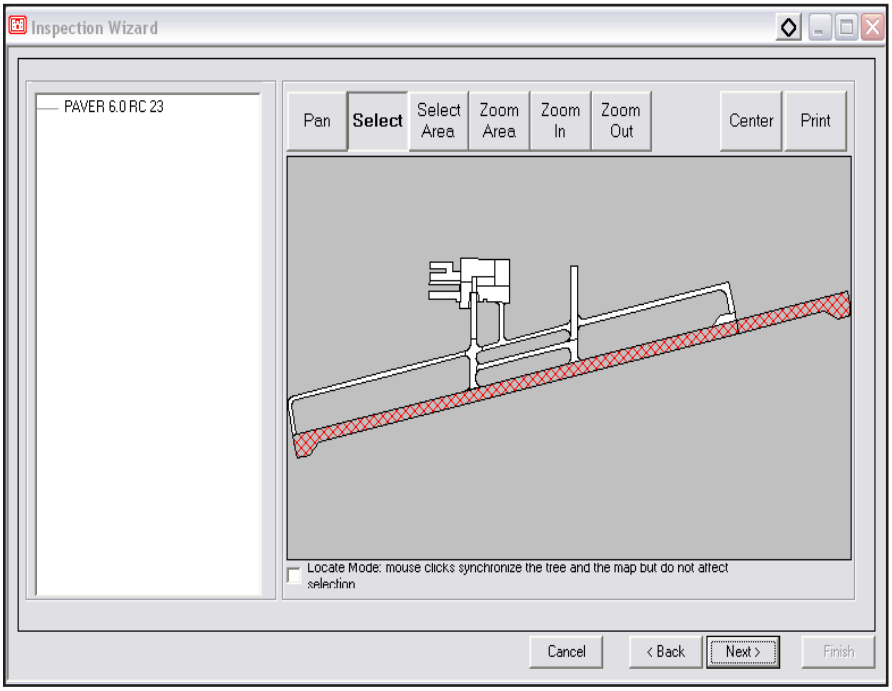


- Select Next and then query all of the runway sections at Neil Armstrong, as shown below.

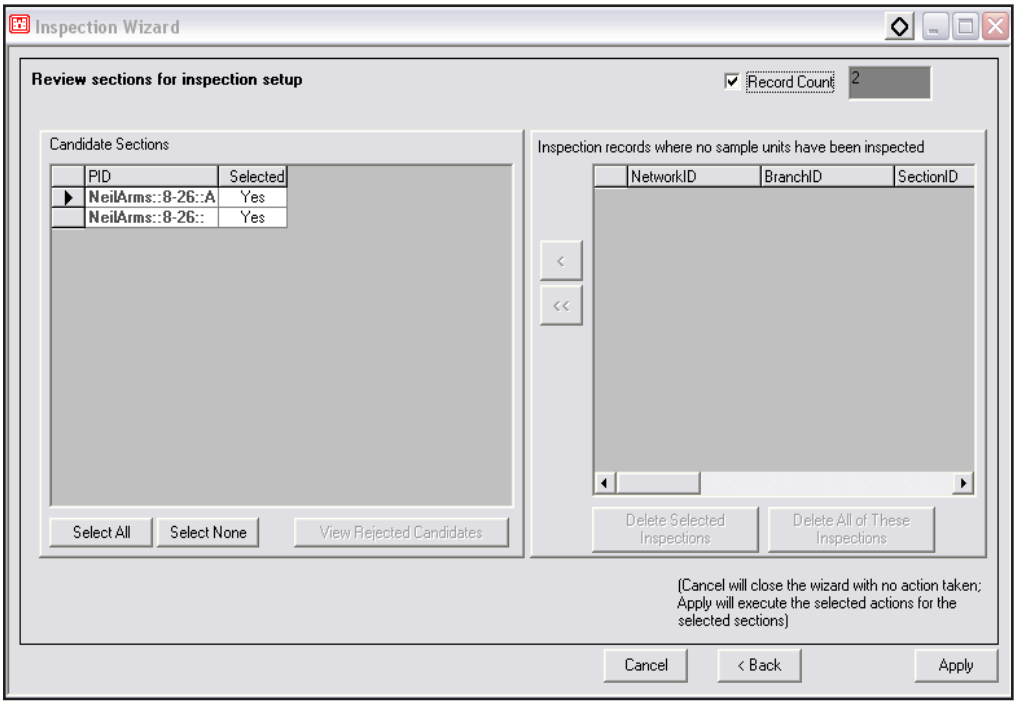
Query as shown



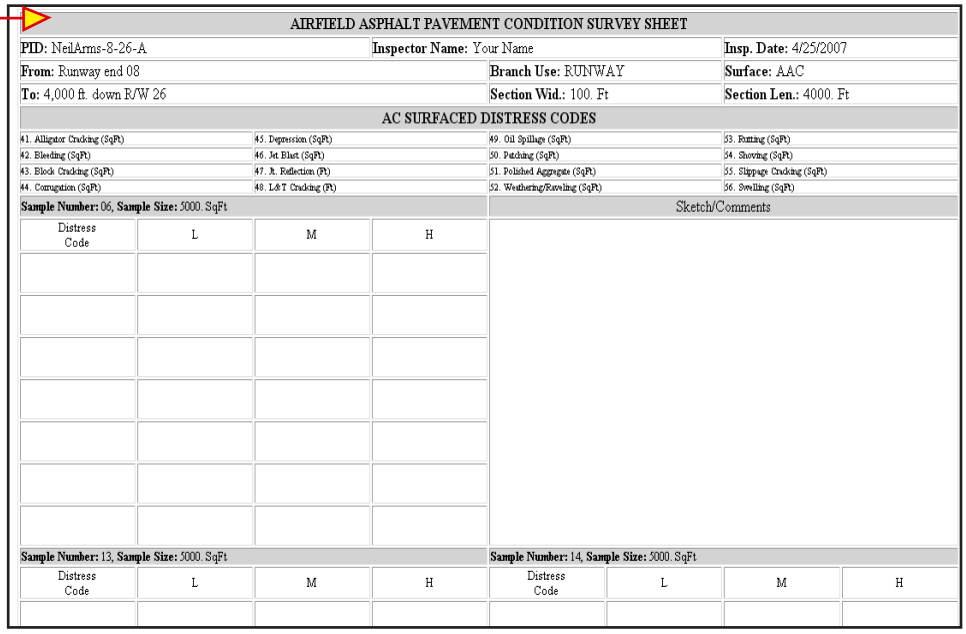
- Select Next and review the selections shown on the map.



- Select Next, review the sections, and then click Apply.



Survey sheet



AIRFIELD ASPHALT PAVEMENT CONDITION SURVEY SHEET

PID: NeilArms-8-26-A	**Inspector Name:** Your Name	**Insp. Date:** 4/25/2007
From: Runway end 08	**Branch Use:** RUNWAY	**Surface:** AAC
To: 4,000 ft. down R/W 26	**Section Wid.:** 100. Ft	**Section Len.:** 4000. Ft

AC SURFACED DISTRESS CODES

41. Alligator Cracking (SqFt)	45. Depression (SqFt)	49. Oil Spillage (SqFt)	53. Rutting (SqFt)
42. Bleeding (SqFt)	46. Jet Blast (SqFt)	50. Patching (SqFt)	54. Shoving (SqFt)
43. Block Cracking (SqFt)	47. R. Reflection (Ft)	51. Polished Aggregate (SqFt)	55. Slippage Cracking (SqFt)
44. Corrugation (SqFt)	48. L&T Cracking (Ft)	52. Weathering/Raveling (SqFt)	56. Swelling (SqFt)

Sample Number: 06, **Sample Size:** 5000. SqFt				Sketch/Comments
Distress Code	L	M	H	

Sample Number: 13, **Sample Size:** 5000. SqFt				**Sample Number:** 14, **Sample Size:** 5000. SqFt			
Distress Code	L	M	H	Distress Code	L	M	H

Reinspection report

Re-inspection Report

Neil Armstrong
Report Generated Date:
Site Name:

Network: NeilArms Name: Auglaize County Airport Authority

Branch: 8-26 Name: RUNWAY 8-26 Use: RUNWAY Area: 532,400.00SqFt

Section: A of 2 From: Runway end 08 To: 4,000 ft. down R/W 26 Last Const.:
Surface: AAC Family: DEFAULT Zone: Category: Rank: p
Area: 400,000.00SqFt Length: 4,000.00Ft Width: 100.00Ft
Shoulder: Street Type: Grade: 0.00 Lanes: 0
Section Comments:

Last Insp. Date: Total Samples: 80 Surveyed: 13
Conditions: PCI : 42
Inspection Comments:

Sample Number: 06 Type: R Area: 5,000.00SqFt
Sample Comments:

52	WEATH/RAVEL	L	999.99	SqFt	Comments:
52	WEATH/RAVEL	M	600.00	SqFt	Comments:
43	BLOCK CR	L	4,999.96	SqFt	Comments:

Sample Number: 13 Type: R Area: 5,000.00SqFt
Sample Comments:

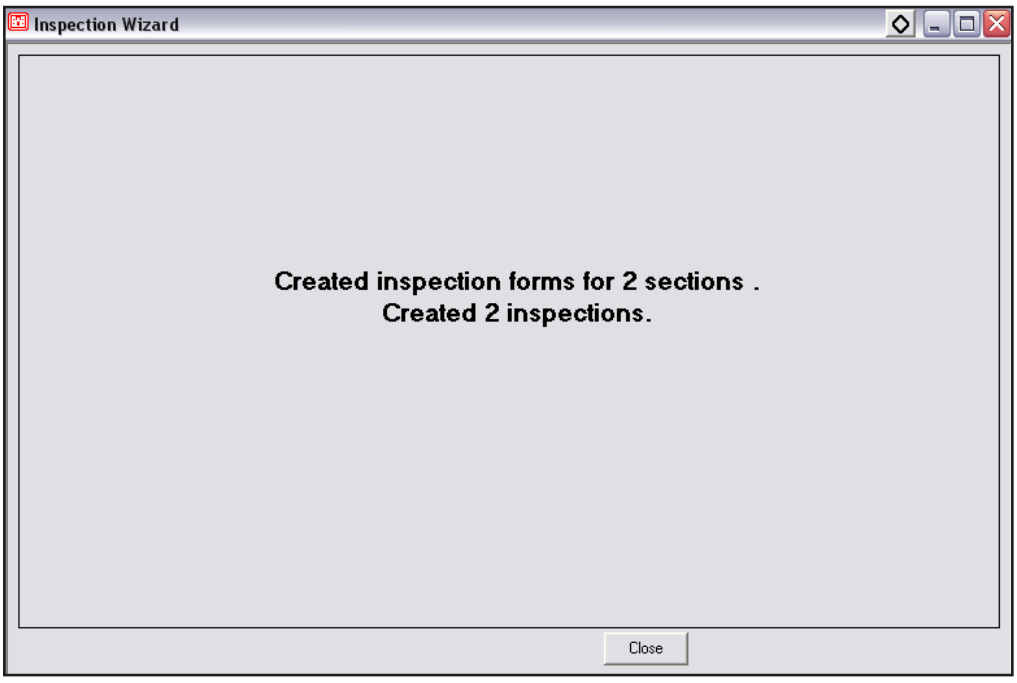
43	BLOCK CR	M	4,999.96	SqFt	Comments:
52	WEATH/RAVEL	L	999.99	SqFt	Comments:
52	WEATH/RAVEL	M	500.00	SqFt	Comments:

Sample Number: 14 Type: R Area: 5,000.00SqFt
Sample Comments:

52	WEATH/RAVEL	M	500.00	SqFt	Comments:
52	WEATH/RAVEL	L	999.99	SqFt	Comments:
43	BLOCK CR	L	4,999.96	SqFt	Comments:

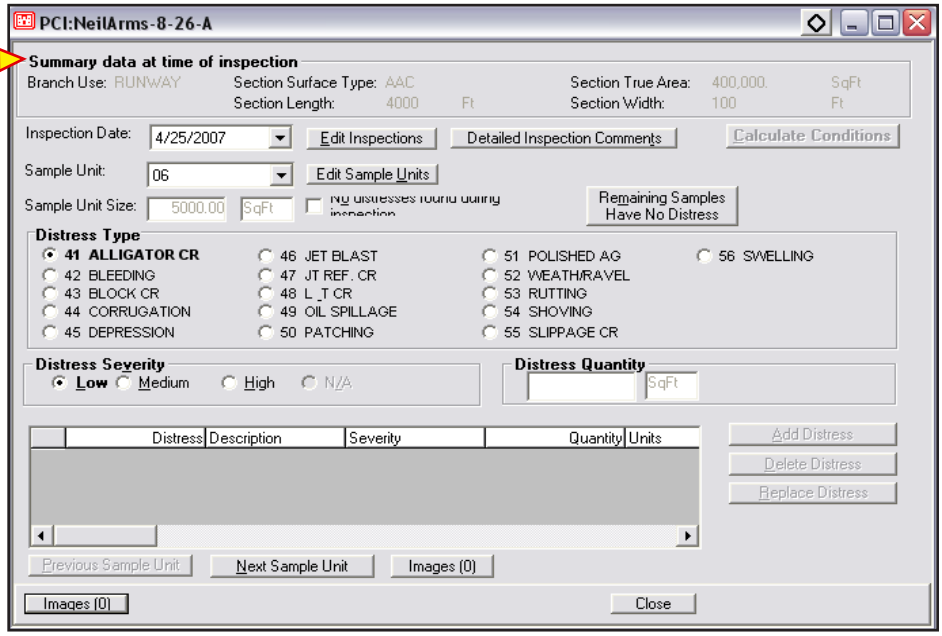
Sample Number: 21 Type: R Area: 5,000.00SqFt
Sample Comments:

52	WEATH/RAVEL	M	500.00	SqFt	Comments:
43	BLOCK CR	L	4,999.96	SqFt	Comments:
52	WEATH/RAVEL	L	999.99	SqFt	Comments:



- Open the PCI Inspection form from the PAVER toolbar, and select section 8-26 (or any other runway section) in order to verify that today's inspection record has been setup.

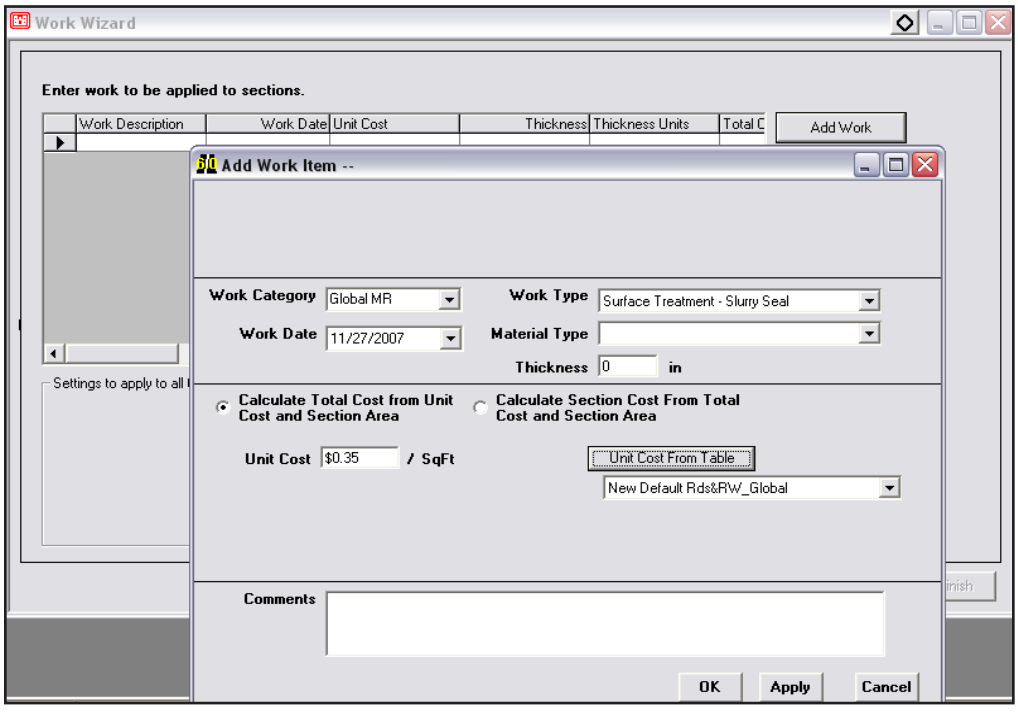
Results of Inspection Setup Wizard on PCI form



2. Work Entry Wizard (Neil Armstrong database):

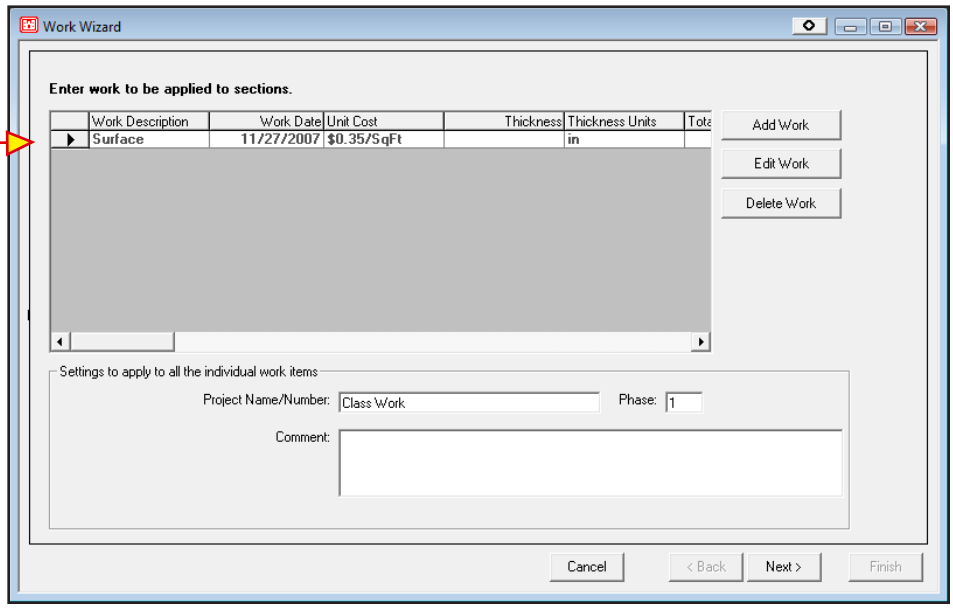
- Using the Neil Armstrong database open the Work Entry wizard via the Wizard icon on the PAVER™ button bar.

- Select the Work Entry wizard, and then Add Work on the Work wizard form. Enter in the information as shown below and then select OK.



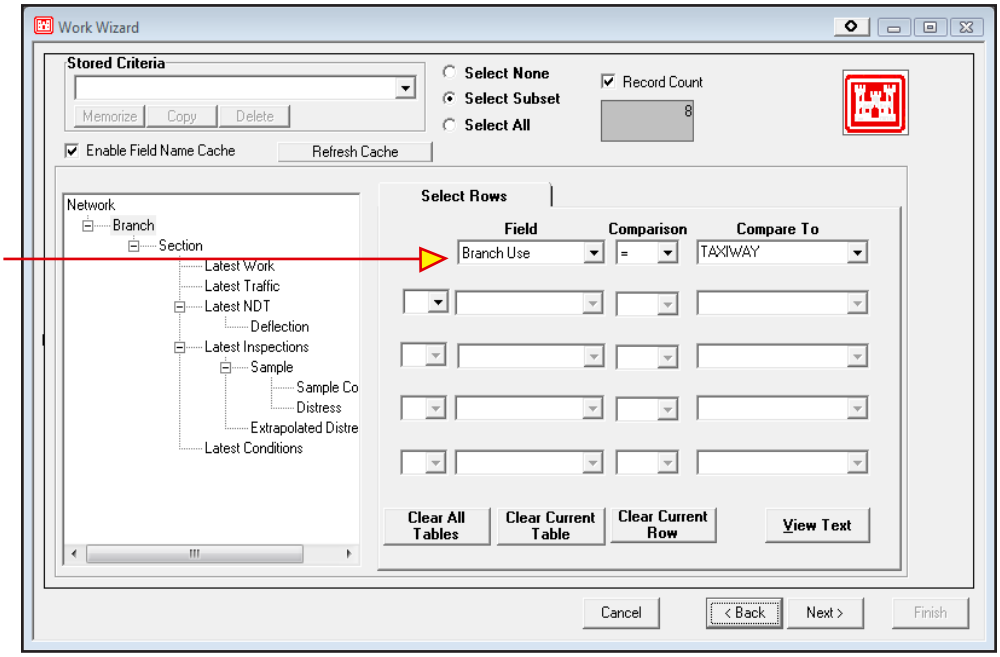
- Enter the Project Name/ Number = Class Work and Phase = 1.

Work to be added

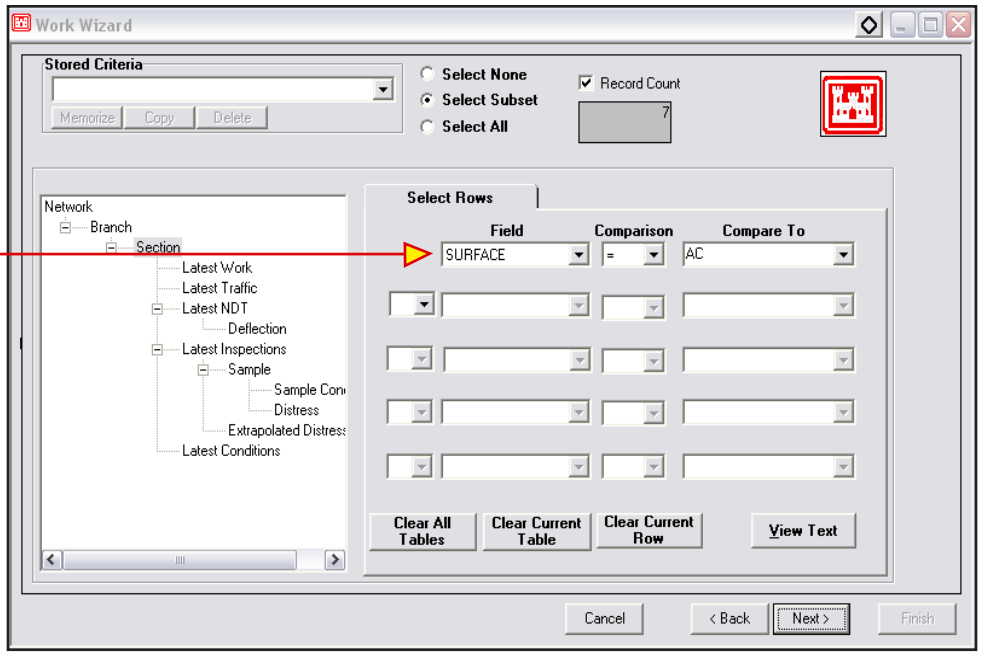


- Click Next and then select the subset of AC Taxiways. Select Record Count if not checked.
- Also Query as seen below for the Sections.

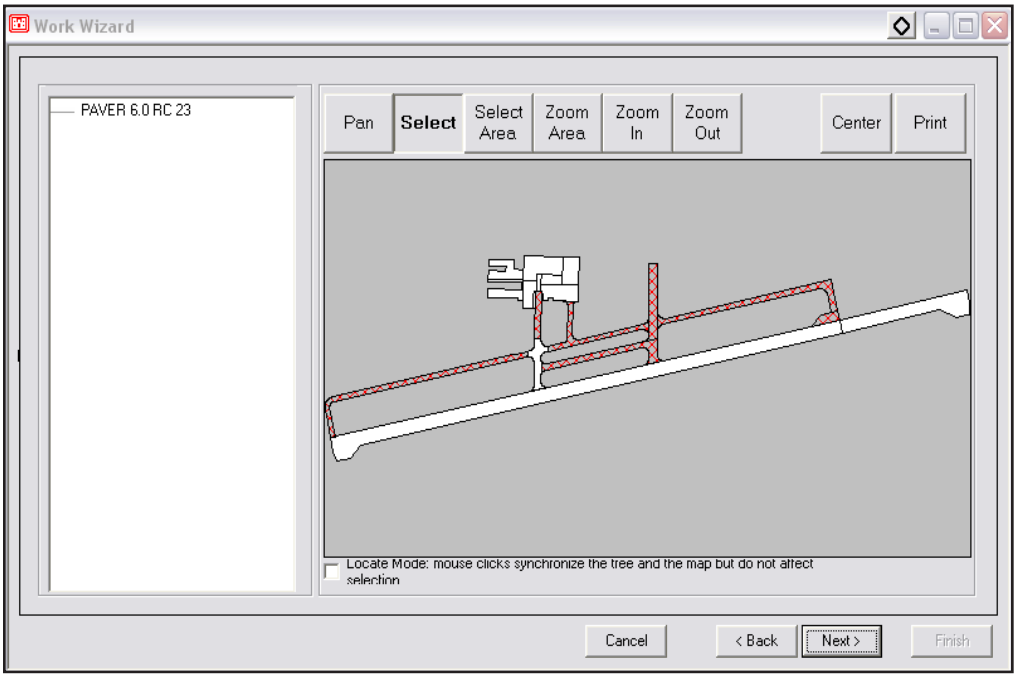
Query as shown



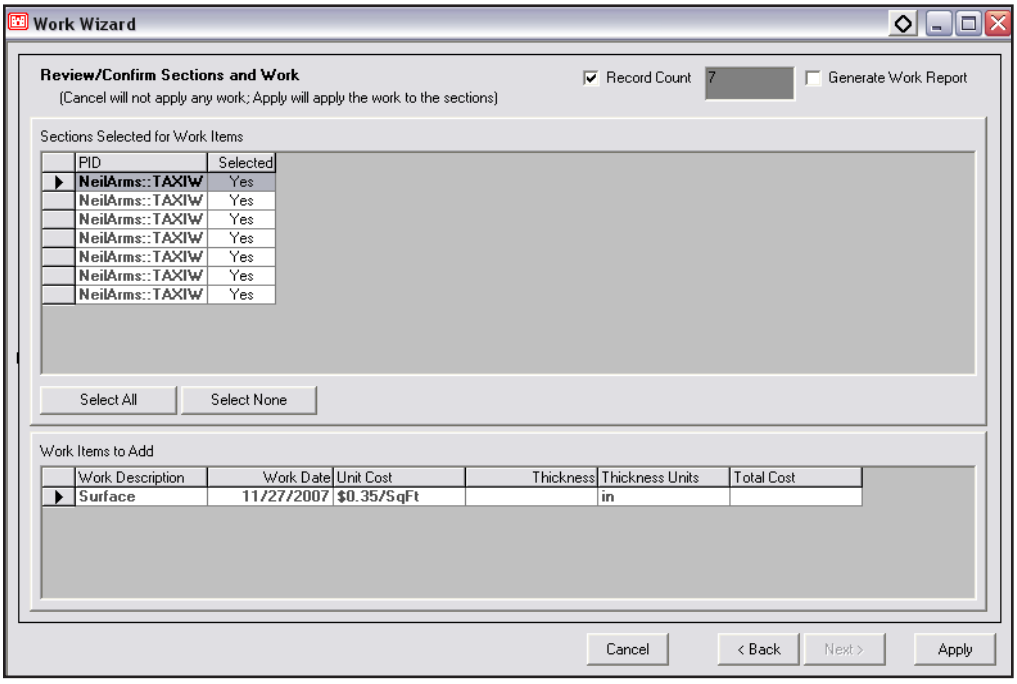
Query as shown



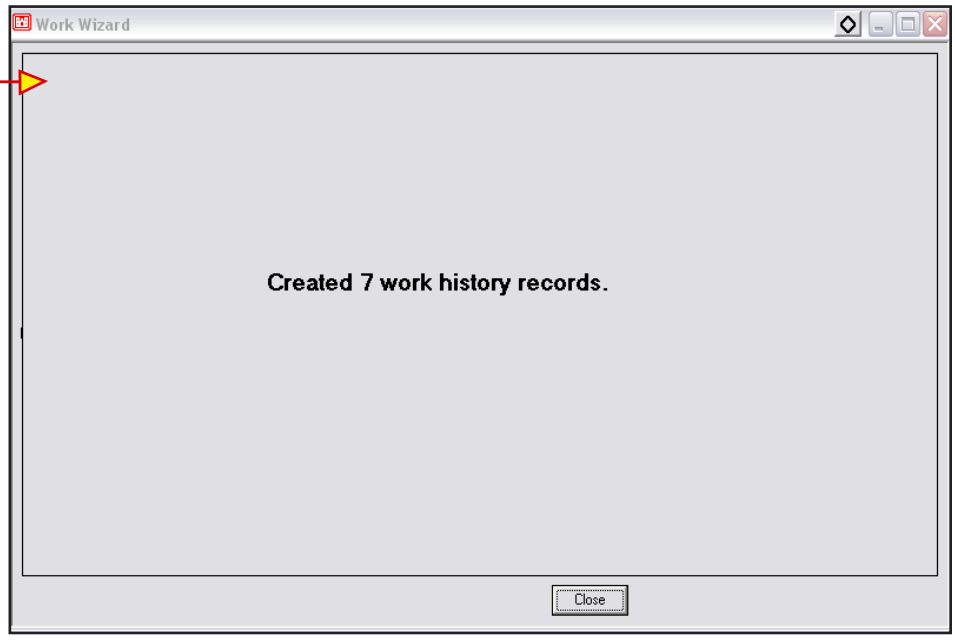
- Select Next and review the selections shown on the map.



- Select Next, review the sections, and then click Apply.



Confirm the results of the added work

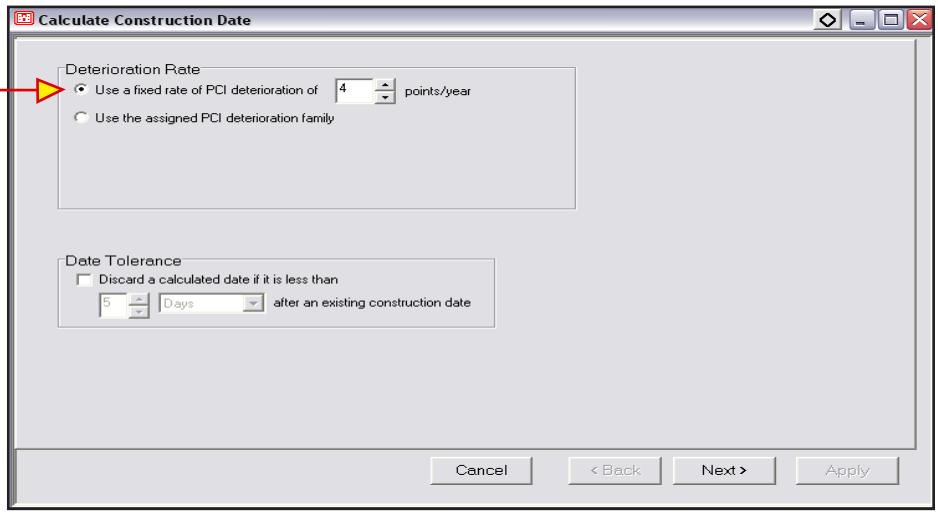


- Review the items by first selecting Work from the PAVER™ button bar, and then selecting one of the AC Taxiways to which work was applied.

3. Calculate Last Construction Date Wizard (Neil Armstrong database):

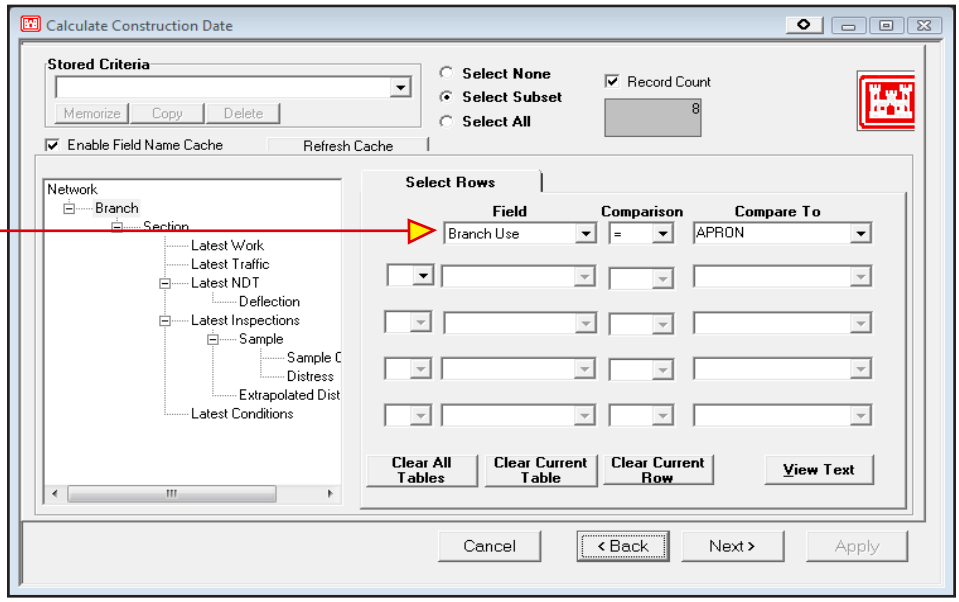
- Using the Neil Armstrong database open the Calculate Last Construction Date wizard via the Wizard icon on the PAVER™ button bar.
- Select the Calculate Last Construction Date wizard, and use a fixed PCI Deterioration rate of 4 points per year.

Use a fixed rate of 4 PCI™ points/ year

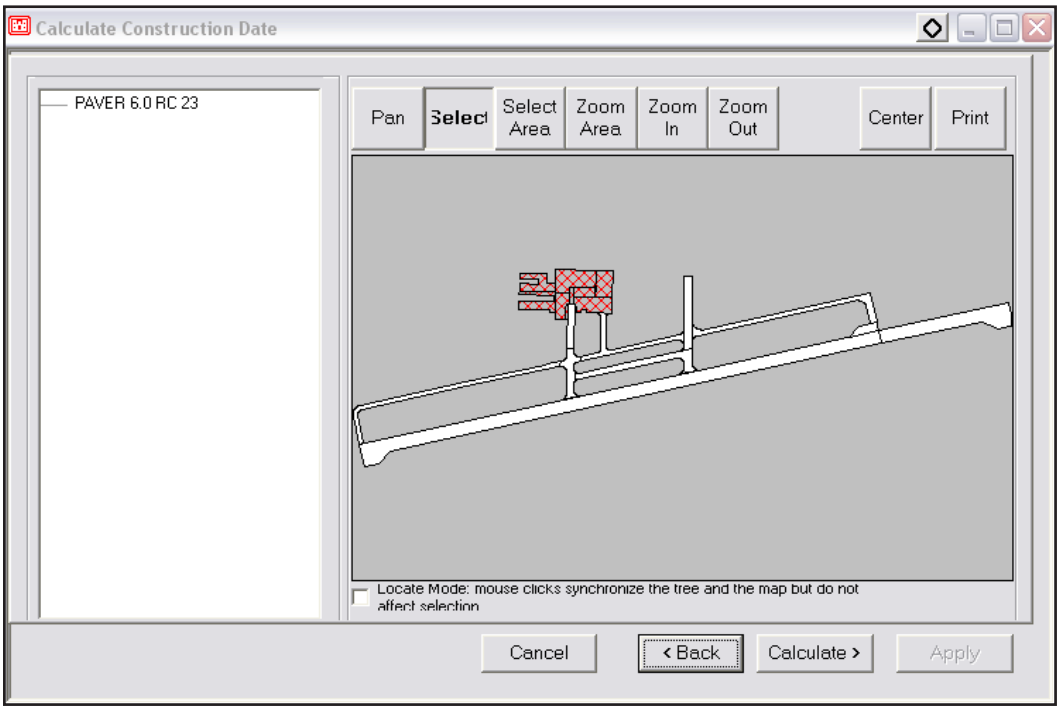


- Click Next and then select the subset of Aprons.

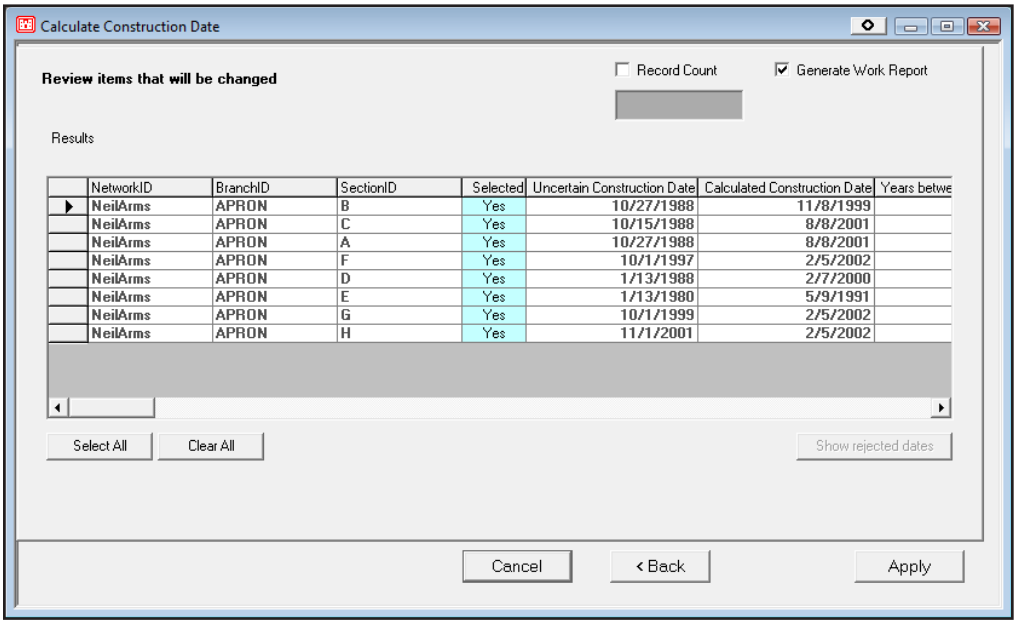
Query as shown



- Select Next and review the selections shown on the map.

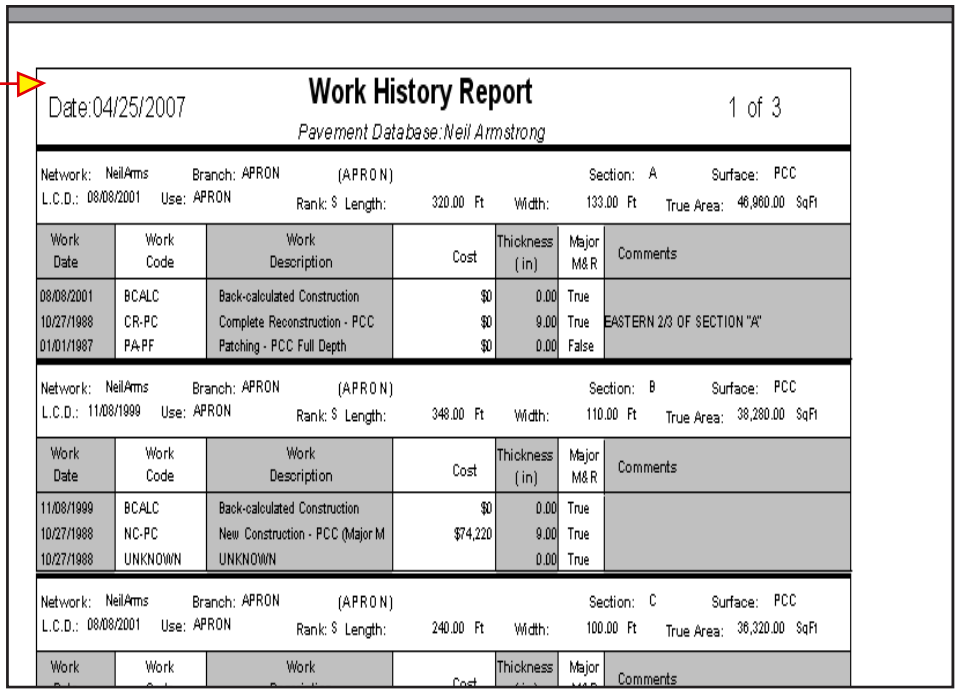


- Click Calculate, review the sections.


Calculate Construction Date
Review items that will be changed
Record Count
Generate Work Report
Results
NetworkID BranchID SectionID Selected Uncertain Construction Date Calculated Construction Date Years betwe
NeilArms APRON B Yes 10/27/1988 11/8/1999
NeilArms APRON C Yes 10/15/1988 8/8/2001
NeilArms APRON A Yes 10/27/1988 8/8/2001
NeilArms APRON F Yes 10/1/1997 2/5/2002
NeilArms APRON D Yes 1/13/1988 2/7/2000
NeilArms APRON E Yes 1/13/1980 5/9/1991
NeilArms APRON G Yes 10/1/1999 2/5/2002
NeilArms APRON H Yes 11/1/2001 2/5/2002
Select All
Clear All
Show rejected dates
Cancel
< Back
Apply

- Select Apply.

Work History results of calculated Last Construction Dates



Date:04/25/2007

Work History Report

Pavement Database:Neil Armstrong

1 of 3

Network: NeilArms Branch: APRON (APRON) Section: A Surface: PCC
L.C.D.: 08/08/2001 Use: APRON Rank: S Length: 320.00 Ft Width: 133.00 Ft True Area: 46,960.00 SqFt

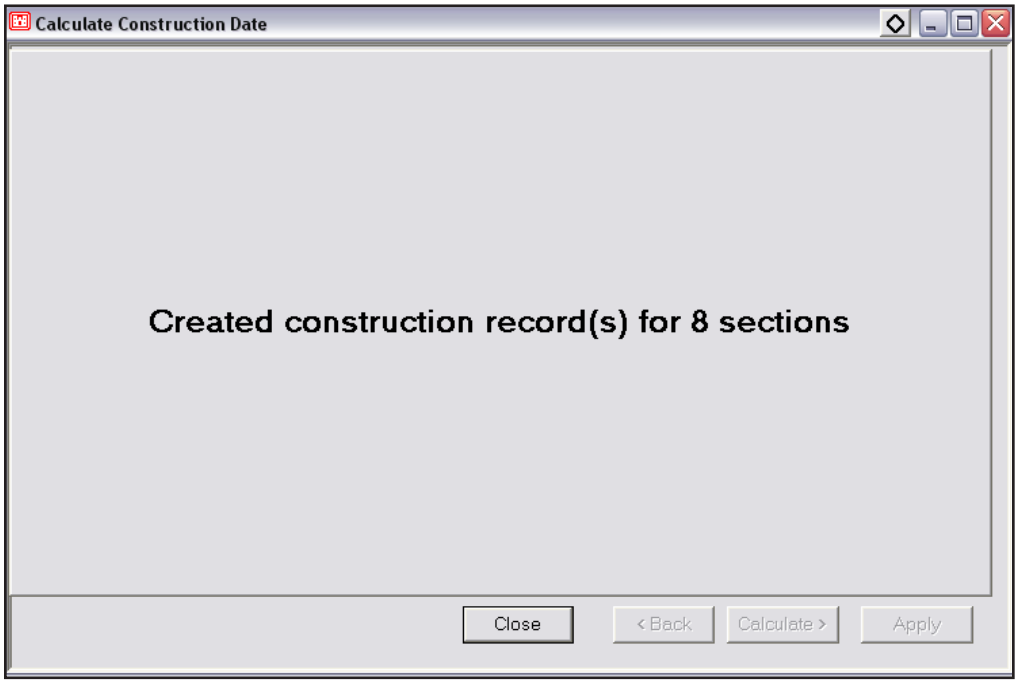
Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
08/08/2001	BCALC	Back-calculated Construction	$0	0.00	True	
10/27/1988	CR-PC	Complete Reconstruction - PCC	$0	9.00	True	EASTERN 2/3 OF SECTION "A"
01/01/1987	PA-PF	Patching - PCC Full Depth	$0	0.00	False	

Network: NeilArms Branch: APRON (APRON) Section: B Surface: PCC
L.C.D.: 11/08/1999 Use: APRON Rank: S Length: 348.00 Ft Width: 110.00 Ft True Area: 38,280.00 SqFt

Work Date	Work Code	Work Description	Cost	Thickness (in)	Major M&R	Comments
11/08/1999	BCALC	Back-calculated Construction	$0	0.00	True	
10/27/1988	NC-PC	New Construction - PCC (Major M	$74,220	9.00	True	
10/27/1988	UNKNOWN	UNKNOWN		0.00	True	

Network: NeilArms Branch: APRON (APRON) Section: C Surface: PCC
L.C.D.: 08/08/2001 Use: APRON Rank: S Length: 240.00 Ft Width: 100.00 Ft True Area: 36,320.00 SqFt

Work	Work	Work	Cost	Thickness	Major	Comments

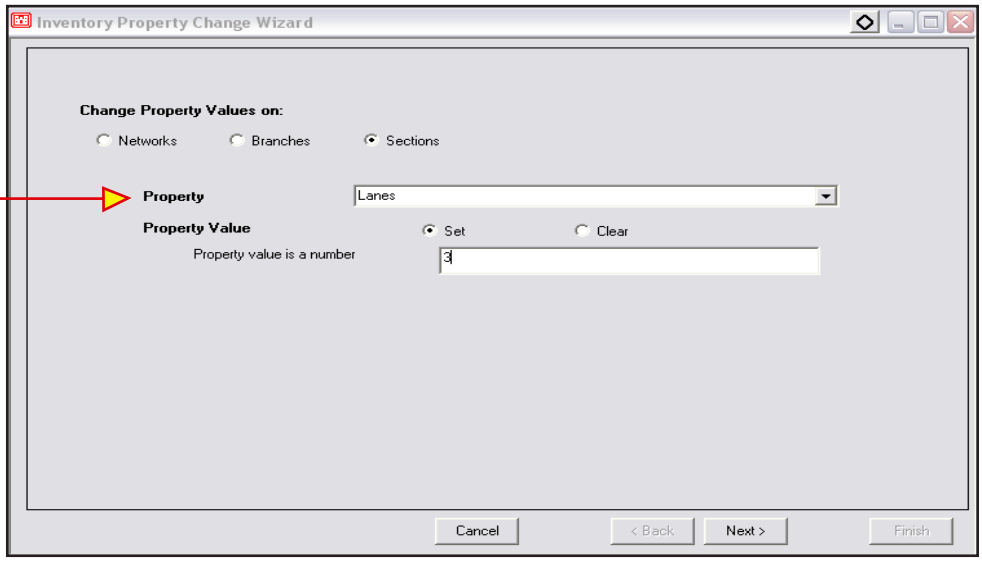


- Review the newly calculated construction dates through the Inventory form or the Work History form, via the PAVER™ toolbar.

4. Set Properties on Multiple Inventory Items Wizard (Interstate Research Parkway database):

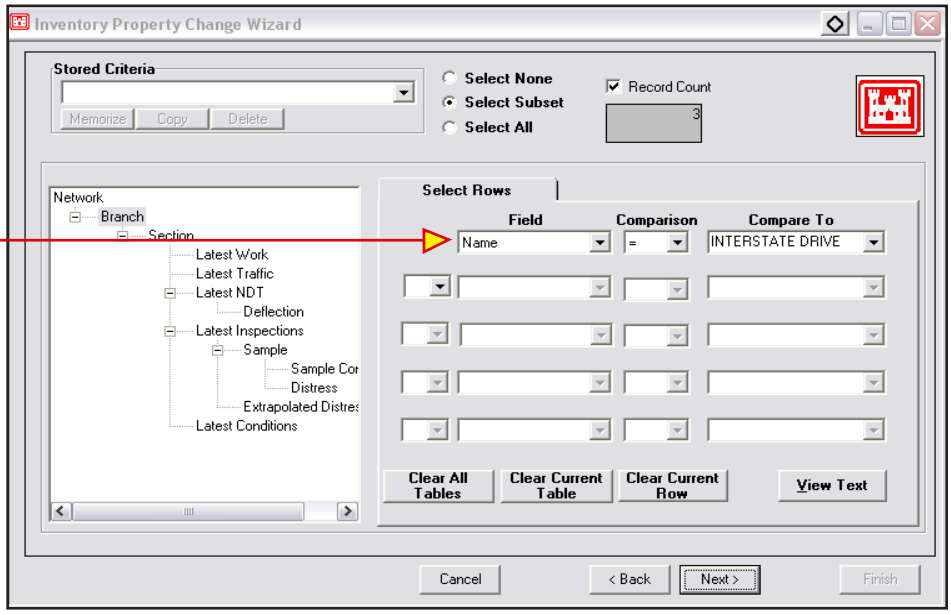
- Using the Interstate Research Parkway database, open Set Properties On Multiple Inventory Items by selecting the Wizard icon on the PAVER™ button bar.
- In the Set Properties On Multiple Inventory Items wizard, select the items shown below.

Select the properties to mass populate

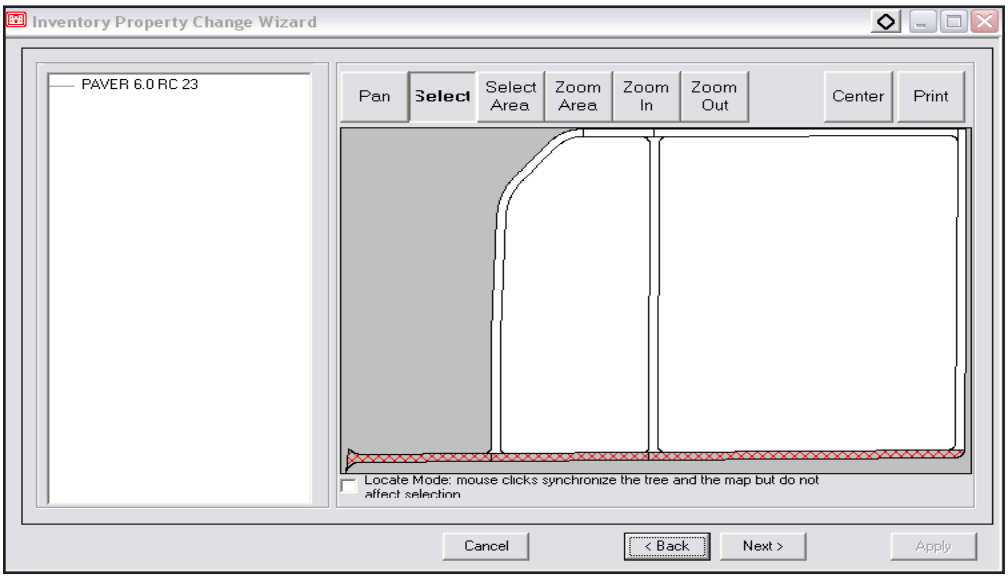


- Click Next and then select the subset of Interstate Drive.

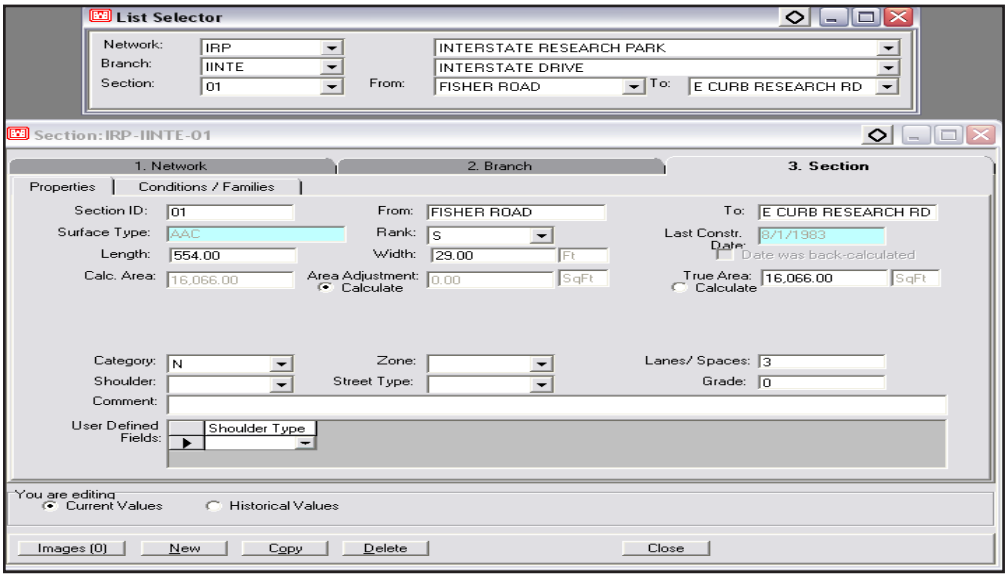
Query as shown



- Click Next and then review the selections shown on the map.



- Select Next, review the sections, and then click Apply to apply all 3 lanes to Interstate Drive. Review this by going to the Inventory form via the PAVER™ button bar and selecting the IINTE Branch (Interstate Drive) as seen below.



Workshop 11: Virtual Inventory

Objectives

Create a Virtual Inventory for an airfield as well as for roads and parking lots.

Database

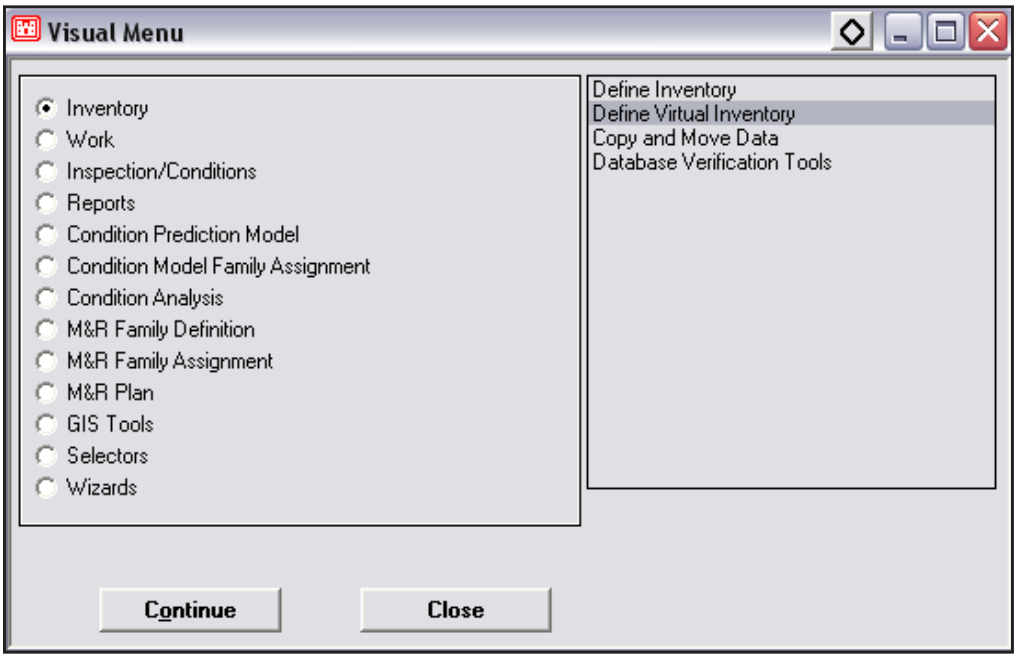
For the airfield, use the Neil Armstrong Workshop 11 database. For the roads and parking lots, use the Roads and Parking Workshop 11 database.

Tasks

1. For Airfields: Create four Virtual Sections (VS) named RW (for runways), TW (for taxiways), AP (for aprons), and Other (for any other uses).
2. For Roads and Parking: Create three Virtual Sections (VS) named RD (for roadways), PL (for parking lots), and Other (for any other uses).

1. Airfields Virtual Inventory:

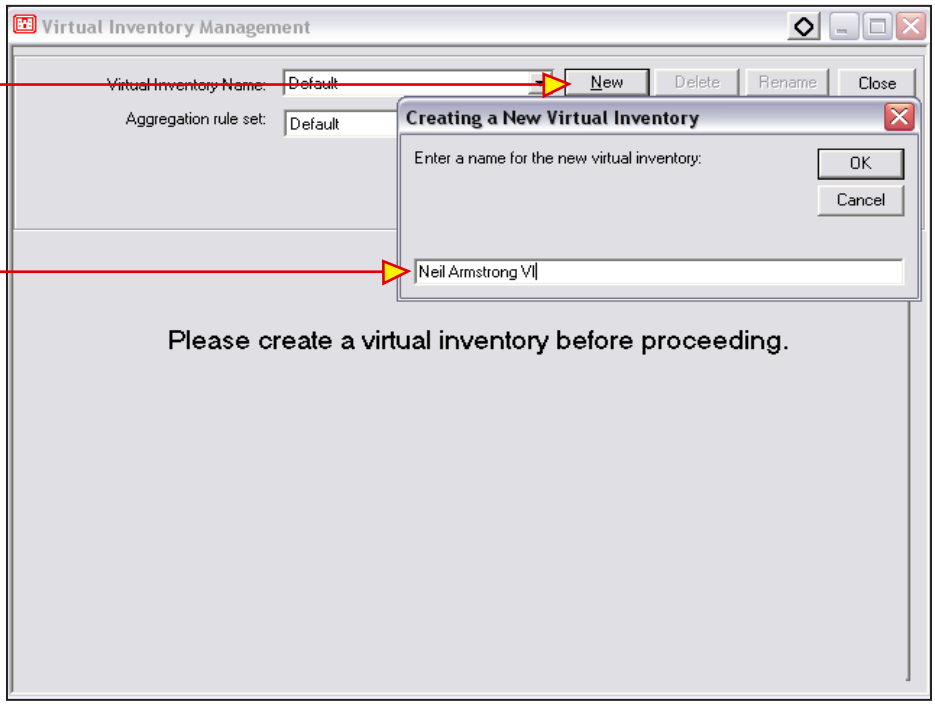
- After opening the Neil Armstrong database, select Visual Menu >> Inventory >> Define Virtual Inventory.



- Select New to create a new Virtual Inventory Name, and call the new virtual inventory Neil Armstrong VI.

Create a new virtual inventory

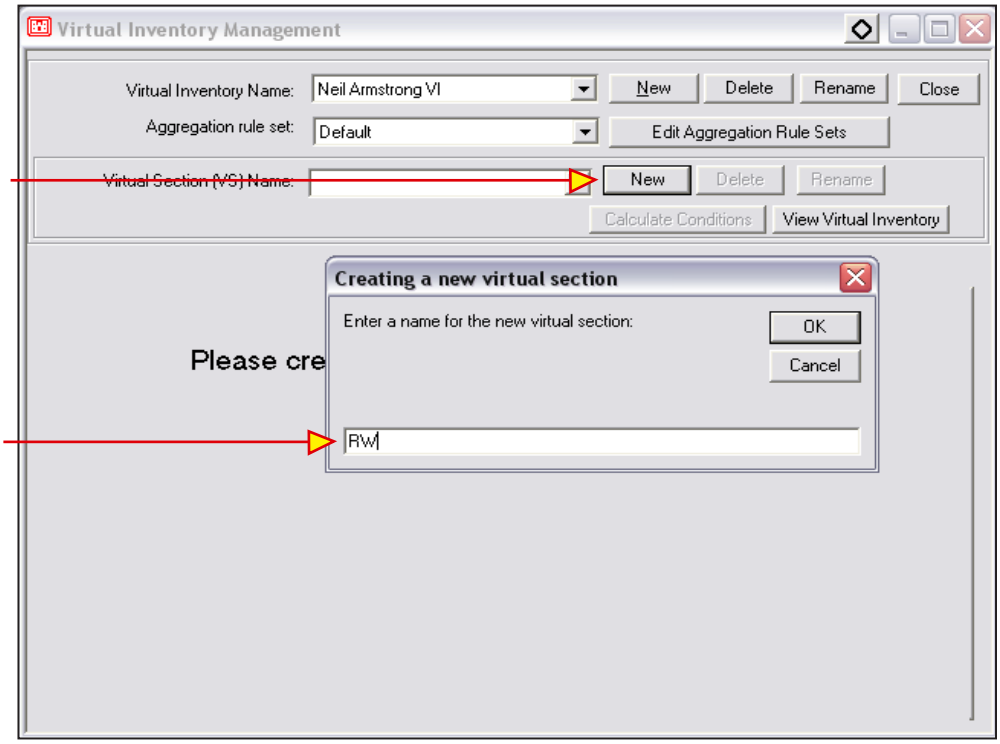
New virtual inventory name



- Create a new Virtual Section (VS) Name by clicking New and call it RW. Click OK.

Create a new virtual section

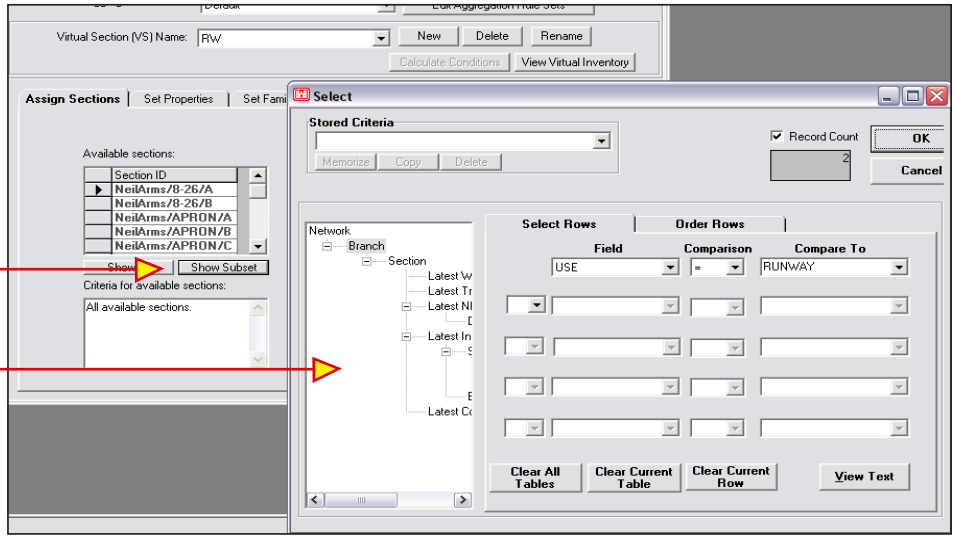
New virtual section name



- Select Show Subset and query all of the runway sections.

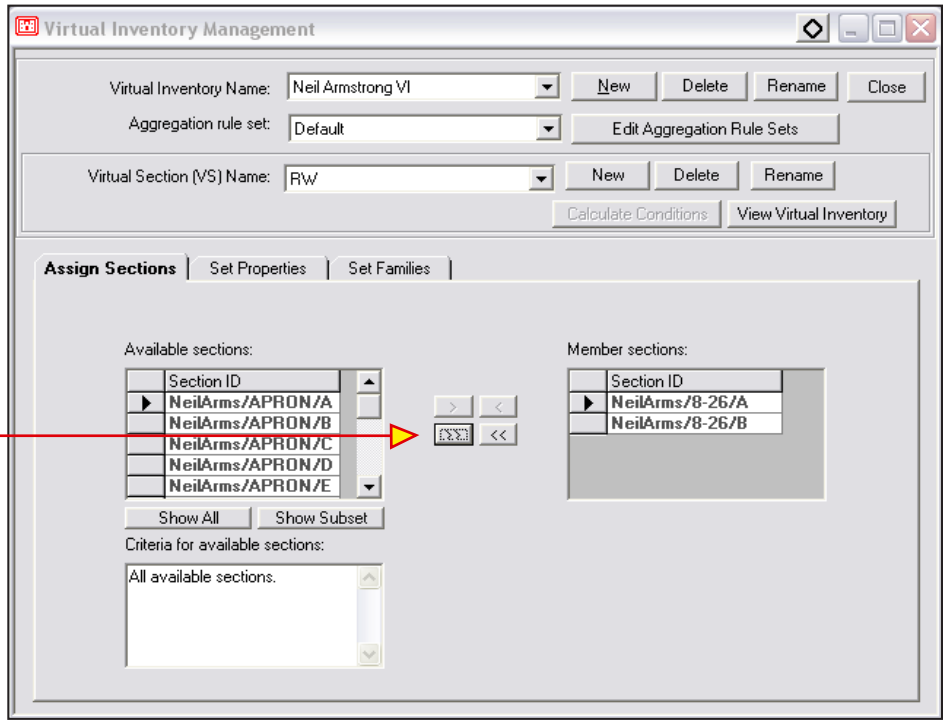
Open the query tool

Define the subset



- After the runway sections have been selected, assign all of them to the virtual section by selecting the double, right-pointing arrows.

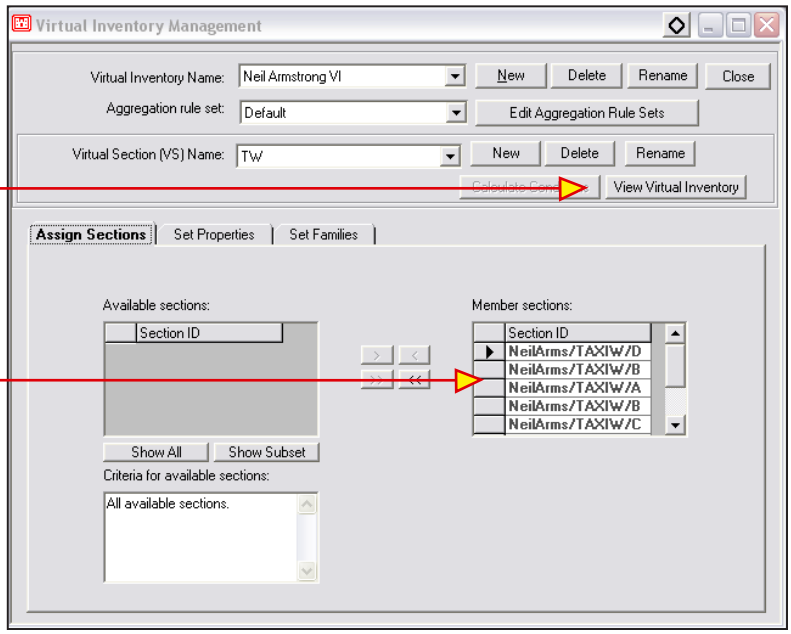
Add sections by highlighting them and then clicking the right-pointing arrows



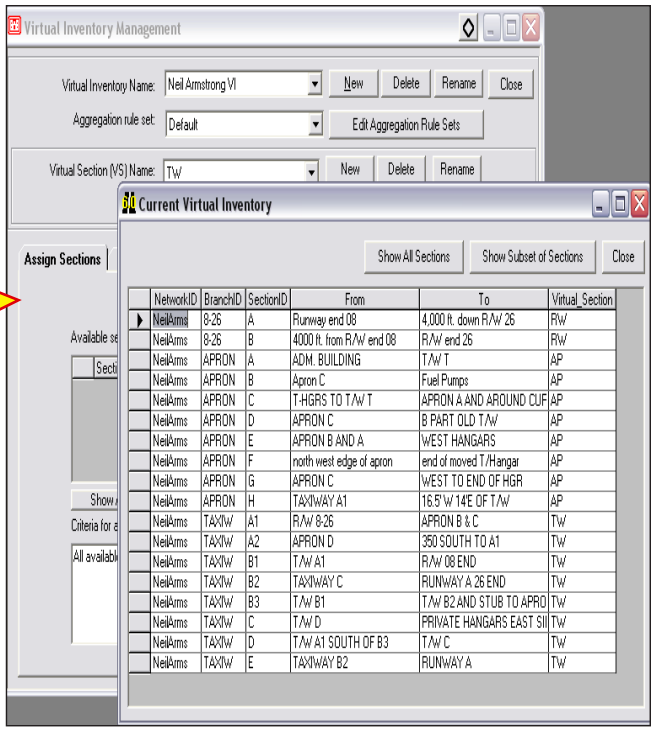
- Create two more virtual section names, TW and AP, for the Neil Armstrong VI virtual inventory. Assign sections to TW and AP using the Show Subset tool
- After the sections have been assigned to the Neil Armstrong VI virtual inventory, review them by selecting the View Virtual Inventory button on the right-side of the Virtual Inventory form.

Review the sections assigned to the virtual sections, per virtual inventory

Virtual section assigned sections

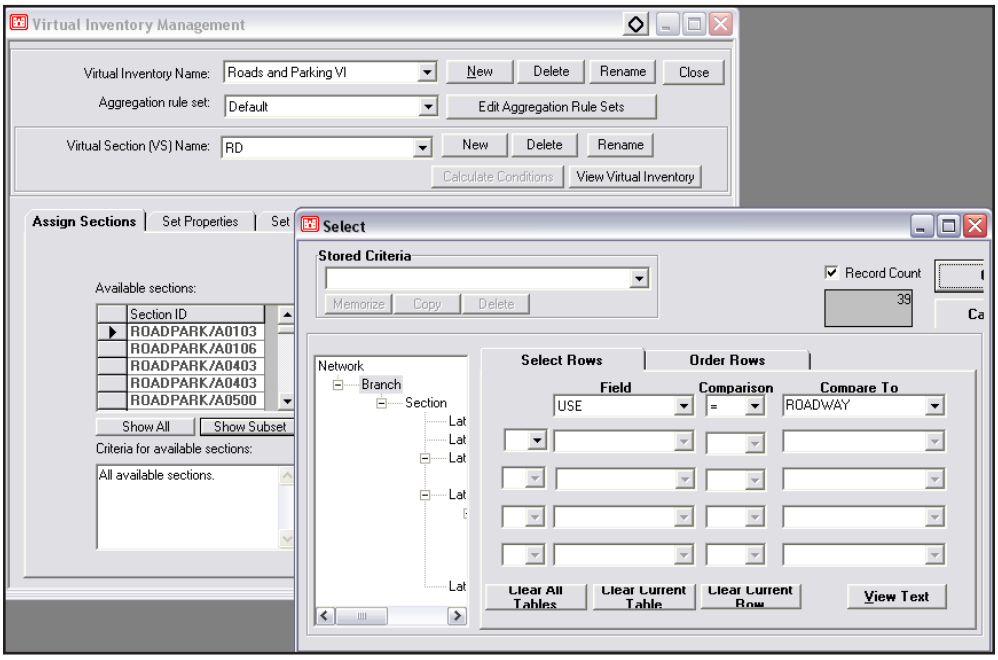


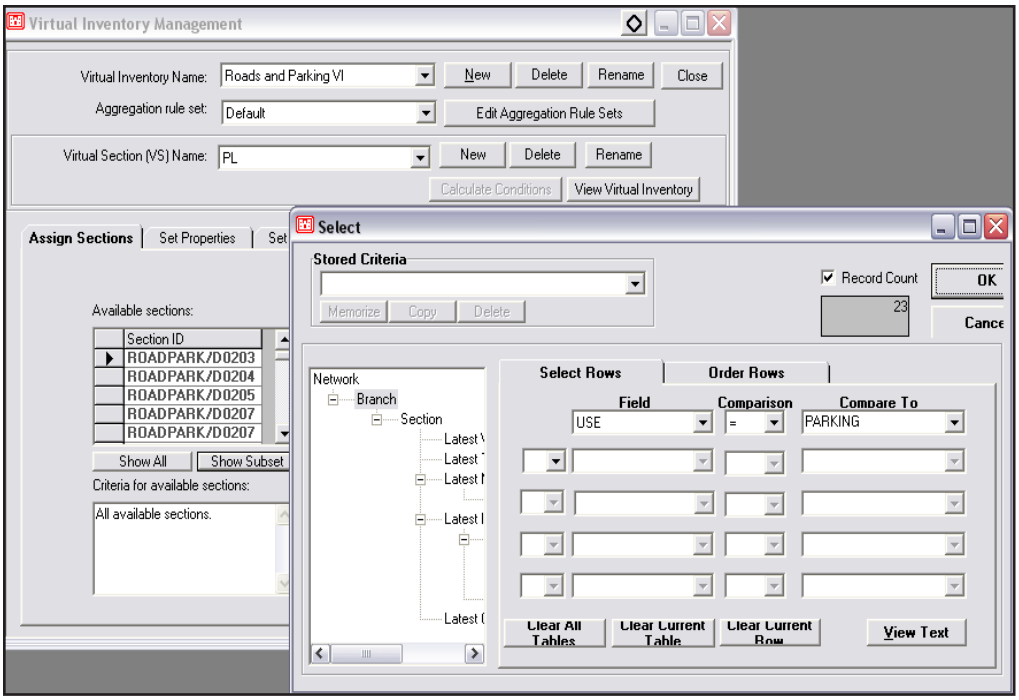
Virtual inventory review

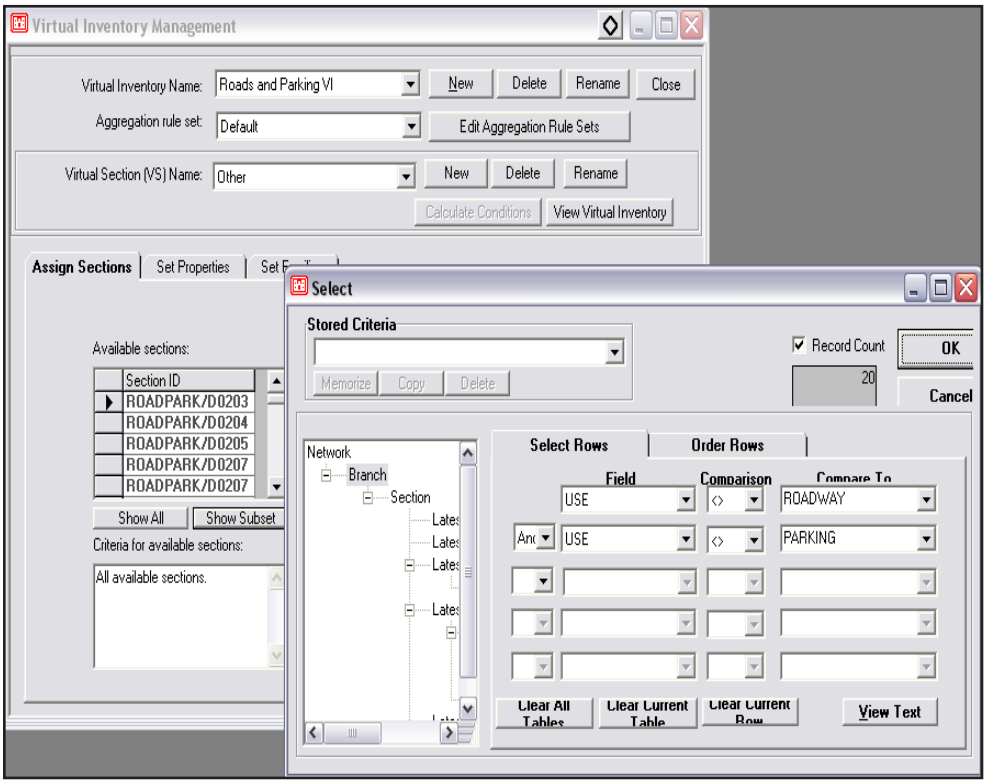

Virtual Inventory Management
Virtual Inventory Name: Neil Armstrong VI
New
Delete
Rename
Close
Aggregation rule set: Default
Edit Aggregation Rule Sets
Virtual Section (VS) Name: TW
New
Delete
Rename
Assign Sections
Current Virtual Inventory
Show All Sections
Show Subset of Sections
Close
NetworkID BranchID SectionID From To Virtual_Section
NeilArms 8-26 A Runway end 08 4,000 ft. down R/W 26 RW
NeilArms 8-26 B 4000 ft. from R/W end 08 R/W end 26 RW
NeilArms APRON A ADM. BUILDING T/W T AP
NeilArms APRON B Apron C Fuel Pumps AP
NeilArms APRON C T-HGRS TO T/W T APRON A AND AROUND CUF AP
NeilArms APRON D APRON C B PART OLD T/W AP
NeilArms APRON E APRON B AND A WEST HANGARS AP
NeilArms APRON F north west edge of apron end of moved T/Hangar AP
NeilArms APRON G APRON C WEST TO END OF HGR AP
NeilArms APRON H TAXIWAY A1 16.5' W 14'E OF T/W AP
NeilArms TAXIW A1 R/W 8-26 APRON B & C TW
NeilArms TAXIW A2 APRON D 350 SOUTH TO A1 TW
NeilArms TAXIW B1 T/W A1 R/W 08 END TW
NeilArms TAXIW B2 TAXIWAY C RUNWAY A 26 END TW
NeilArms TAXIW B3 T/W B1 T/W B2 AND STUB TO APRO TW
NeilArms TAXIW C T/W D PRIVATE HANGARS EAST SII TW
NeilArms TAXIW D T/W A1 SOUTH OF B3 T/W C TW
NeilArms TAXIW E TAXIWAY B2 RUNWAY A TW

2. Roads and Parking Lots VI:

- After opening the Roads and Parking database, create a Virtual Inventory named Roads and Parking VI. Create three Virtual Sections named RD (for roadways), PL (for parking lots), and Other (for any other uses). Use the above airfields example as well as the below images to guide you through the process.

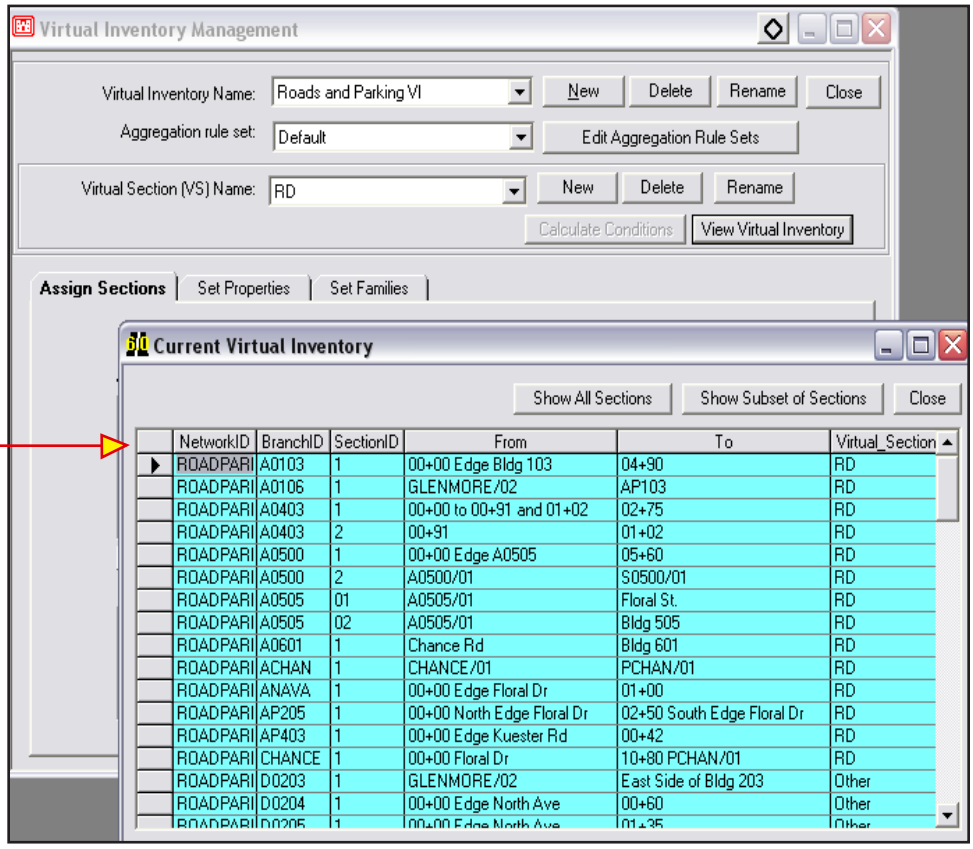



Virtual Inventory Management
Virtual Inventory Name:
Roads and Parking VI
New
Delete
Rename
Close
Aggregation rule set:
Default
Edit Aggregation Rule Sets
Virtual Section (VS) Name:
PL
New
Delete
Rename
Calculate Conditions
View Virtual Inventory
Assign Sections
Set Properties
Available sections:
Section ID
ROADPARK/D0203
ROADPARK/D0204
ROADPARK/D0205
ROADPARK/D0207
ROADPARK/D0207
Show All
Show Subset
Criteria for available sections:
All available sections.
Select
Stored Criteria
Memorize
Copy
Delete
Record Count
23
OK
Cance
Network
Branch
Section
Select Rows
Order Rows
Field
Comparison
Compare To
USE
=
PARKING
Clear All Tables
Clear Current Table
Clear Current Row
View Text


Virtual Inventory Management
Virtual Inventory Name:
Roads and Parking VI
New
Delete
Rename
Close
Aggregation rule set:
Default
Edit Aggregation Rule Sets
Virtual Section (VS) Name:
Other
New
Delete
Rename
Calculate Conditions
View Virtual Inventory
Assign Sections
Set Properties
Available sections:
Section ID
ROADPARK/D0203
ROADPARK/D0204
ROADPARK/D0205
ROADPARK/D0207
ROADPARK/D0207
Show All
Show Subset
Criteria for available sections:
All available sections.
Select
Stored Criteria
Memorize
Copy
Delete
Record Count
20
OK
Cancel
Network
Branch
Section
Select Rows
Order Rows
Field
Comparison
Compare To
USE
<>
ROADWAY
And
USE
<>
PARKING
Clear All Tables
Clear Current Table
Clear Current Row
View Text

- Review the Virtual Inventory by selecting the View Virtual Inventory button on the right-side of the Virtual Inventory form.

Virtual inventory review



NetworkID	BranchID	SectionID	From	To	Virtual_Section
ROADPARI	A0103	1	00+00 Edge Bldg 103	04+90	RD
ROADPARI	A0106	1	GLENMORE/02	AP103	RD
ROADPARI	A0403	1	00+00 to 00+91 and 01+02	02+75	RD
ROADPARI	A0403	2	00+91	01+02	RD
ROADPARI	A0500	1	00+00 Edge A0505	05+60	RD
ROADPARI	A0500	2	A0500/01	S0500/01	RD
ROADPARI	A0505	01	A0505/01	Floral St.	RD
ROADPARI	A0505	02	A0505/01	Bldg 505	RD
ROADPARI	A0601	1	Chance Rd	Bldg 601	RD
ROADPARI	ACHAN	1	CHANCE/01	PCHAN/01	RD
ROADPARI	ANAVA	1	00+00 Edge Floral Dr	01+00	RD
ROADPARI	AP205	1	00+00 North Edge Floral Dr	02+50 South Edge Floral Dr	RD
ROADPARI	AP403	1	00+00 Edge Kuester Rd	00+42	RD
ROADPARI	CHANCE	1	00+00 Floral Dr	10+80 PCHAN/01	RD
ROADPARI	D0203	1	GLENMORE/02	East Side of Bldg 203	Other
ROADPARI	D0204	1	00+00 Edge North Ave	00+60	Other
ROADPARI	D0205	1	00+00 Edge North Ave	01+35	Other

Workshop 12: Creation Of Condition Prediction Model

Objective

Create a Condition Prediction Model for AC Taxiways.

Database

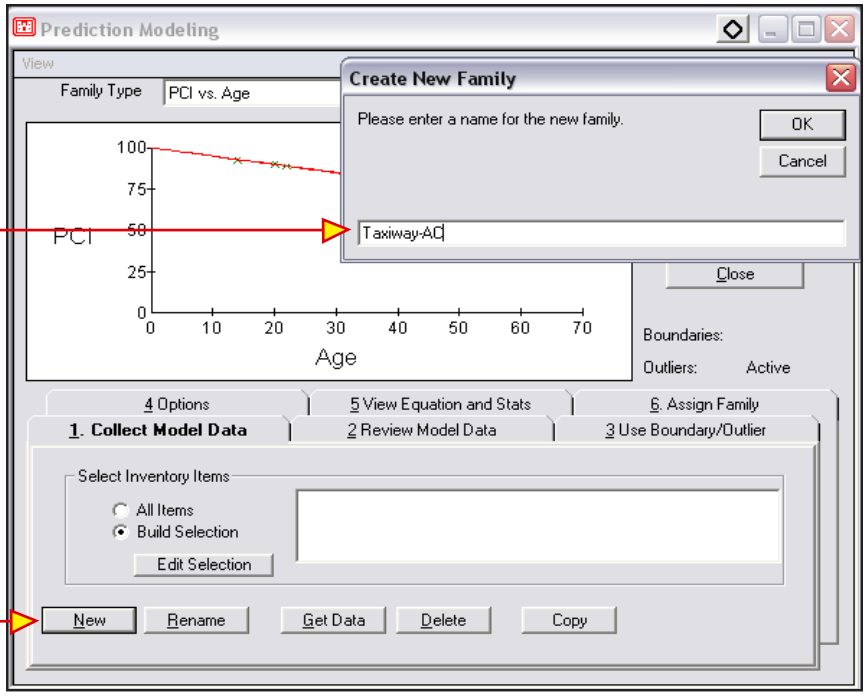
Open the Neil Armstrong Workshop 12 database by clicking File >> Open Database, selecting Neil Armstrong Workshop 12.pvr and clicking Open.

- Click the Prediction Modeling button on the PAVER™ button bar.

- Click New to create a new model named Taxiway-AC and click OK.

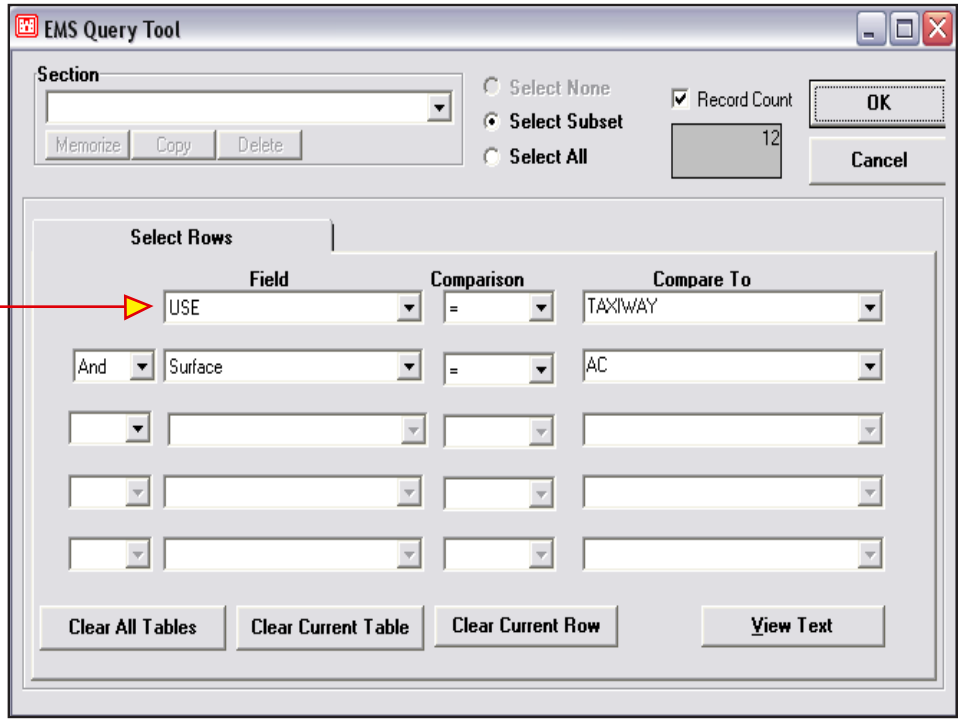
Name the new model

Create a new prediction model



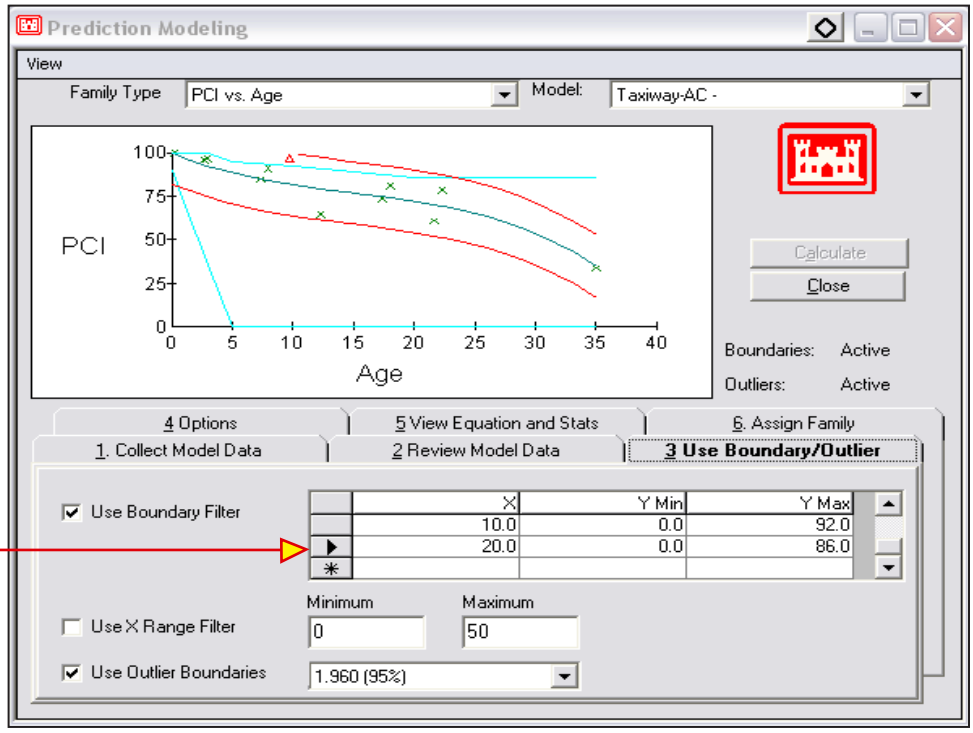
- When the Query Tool launches, select the drop-down list box under Field and choose Branch Use. For comparison choose Equals (=), Compare To Taxiway, and select And Surface = AC, and then click OK.

Create the query



- Click on tabs 2,3,4, and 5 to review the data that was used, or to change some of the model settings.

Model data and properties

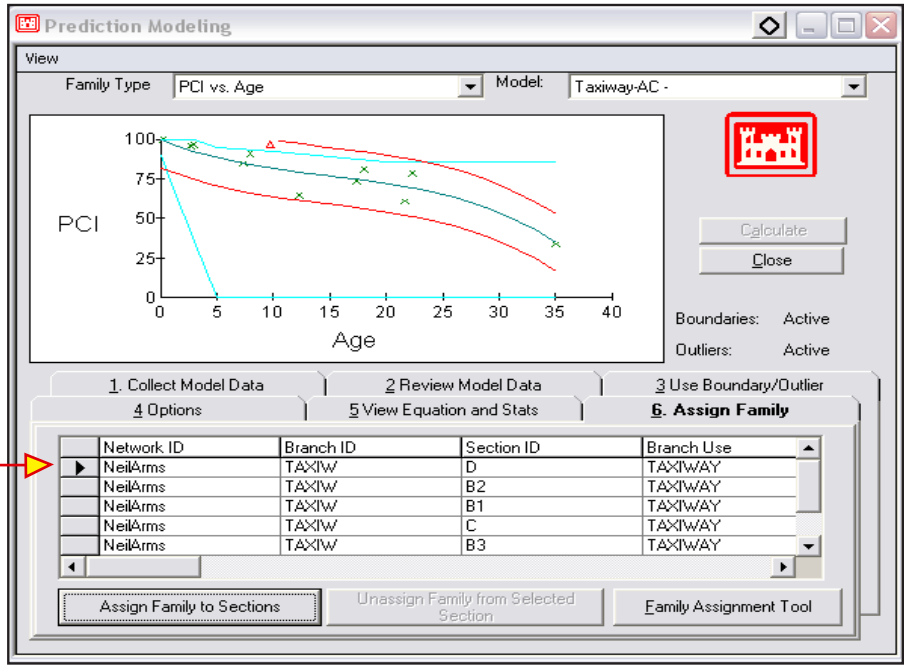


Note: To add additional points in the model based on experience, go to tab 2 (Review Model Data), right-click, and choose Add to add additional data. Similarly, choose Remove to delete individual data points.

Note: When you create a prediction model, you are not editing your pavement data. The prediction model makes a copy of the data points, so editing of the prediction models will not have an impact on your pavement data.

- If you are satisfied with the model and want to assign it to data, click tab 6. To assign the pavement features used to create the model to the new model, click Assign Families To Sections.

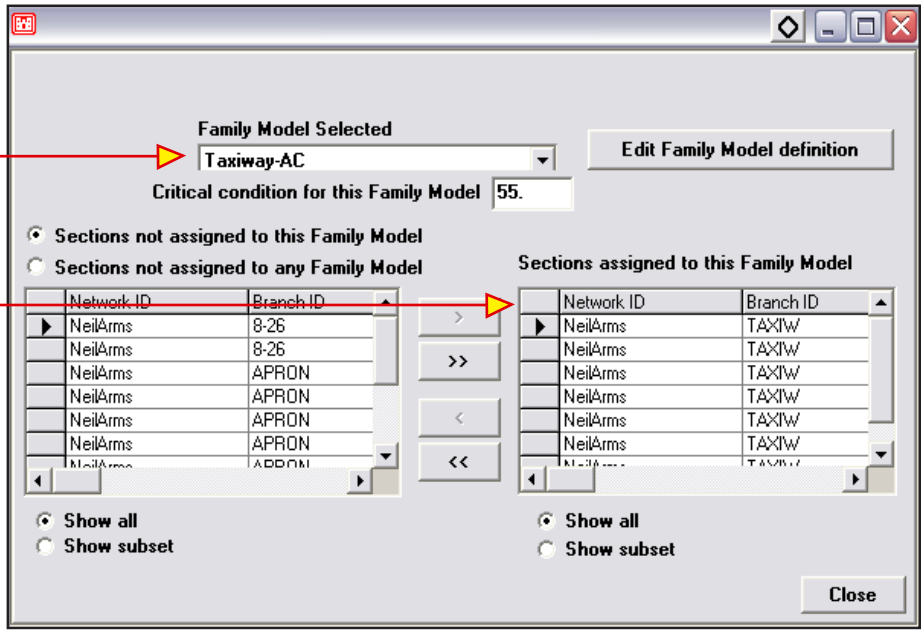
Sections used to create the model



- To add other pavement features to the model, click on the Family Assignment Tool button. The Family Assignment Tool can be used to edit what pavement sections are assigned to the tool.

Current model

Assign families of sections to the model



Workshop 13: Condition Analysis

Objective

Create a report indicating the history of condition and the future of condition.

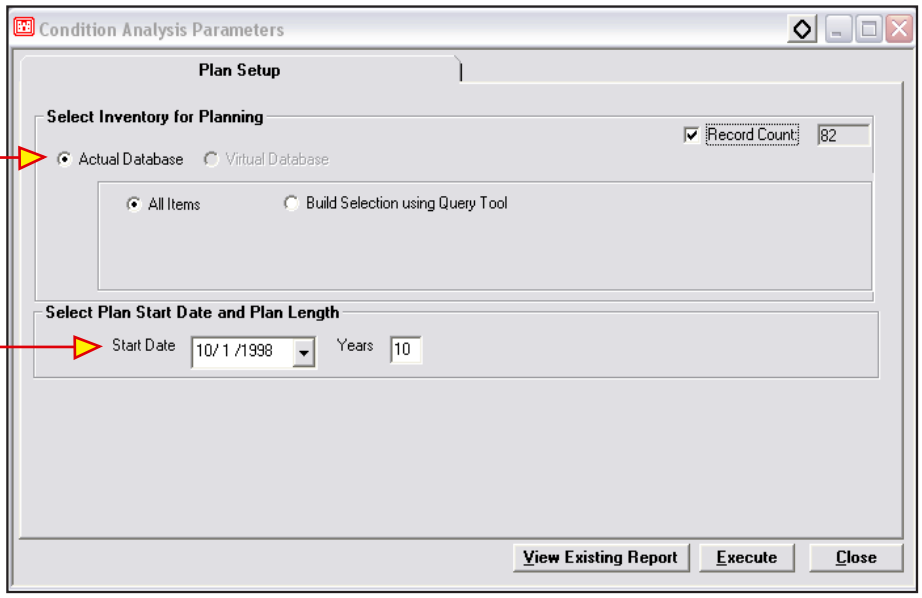
Database

Open the Roads and Parking Workshop 13 database by clicking File >> Open Database, selecting Roads and Parking Workshop 13.pvr and clicking Open.

- Click the Condition Analysis button on the PAVER™ button bar.
- With Actual Database selected, Select All items and enter the Start Date as 10/1/1998, and the Plan Length as 10 years. Click Execute.

Use the actual database

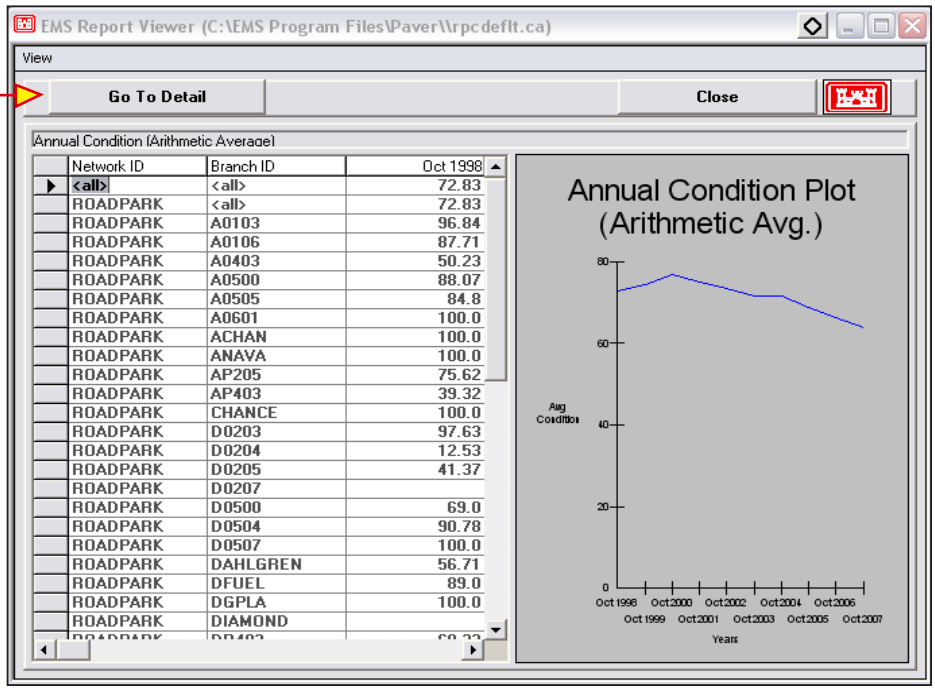
Start date and plan length



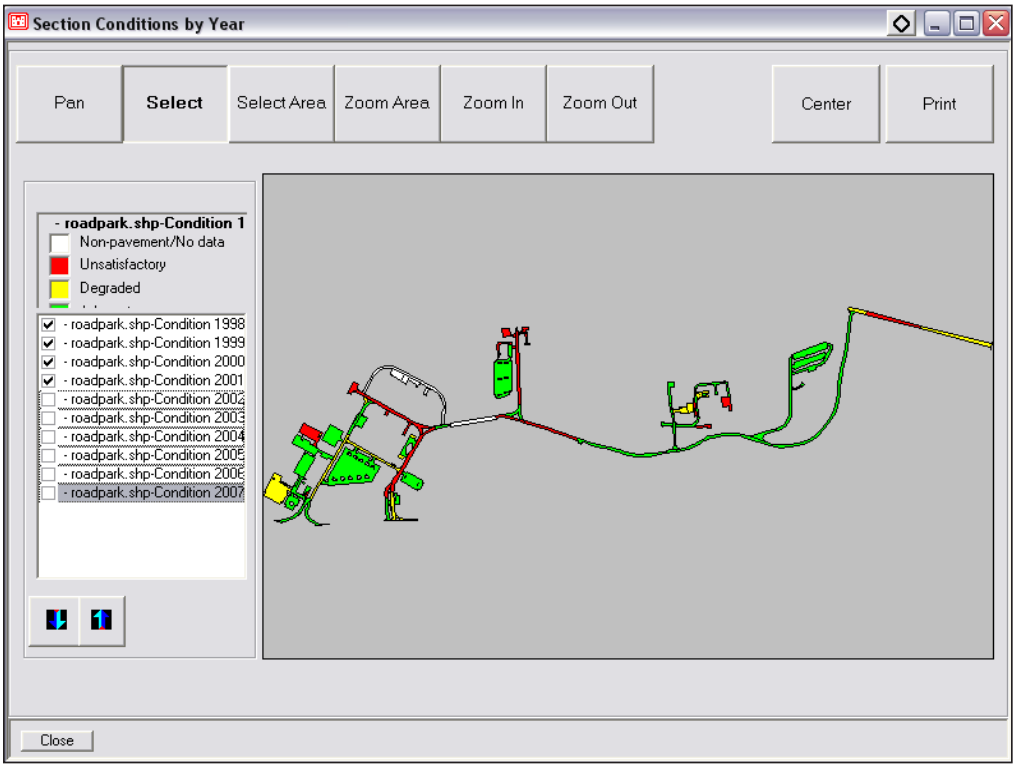
Note: The Load Parameters button can be used to restore the settings used in a prior saved Condition Analysis Report

- Click the Go To Detail button to view the results of the report at the section level. Click the Go To Summary button to go back to the network level view (networks and branches).

Switch between Detail and Summary views

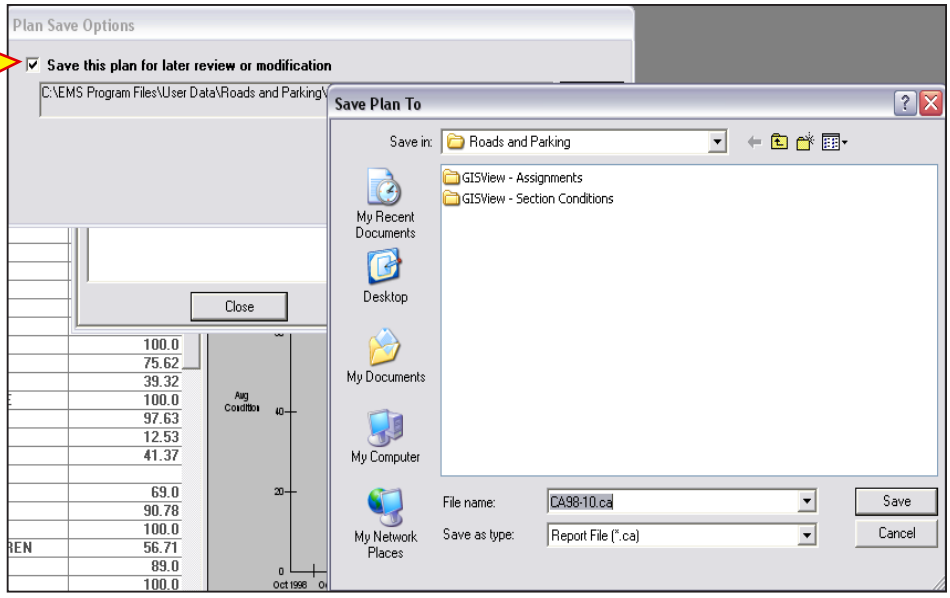


- In the Select GIS Views box, click Section Conditions By Year to show a map of the resulting conditions over time based on the pavement deterioration.

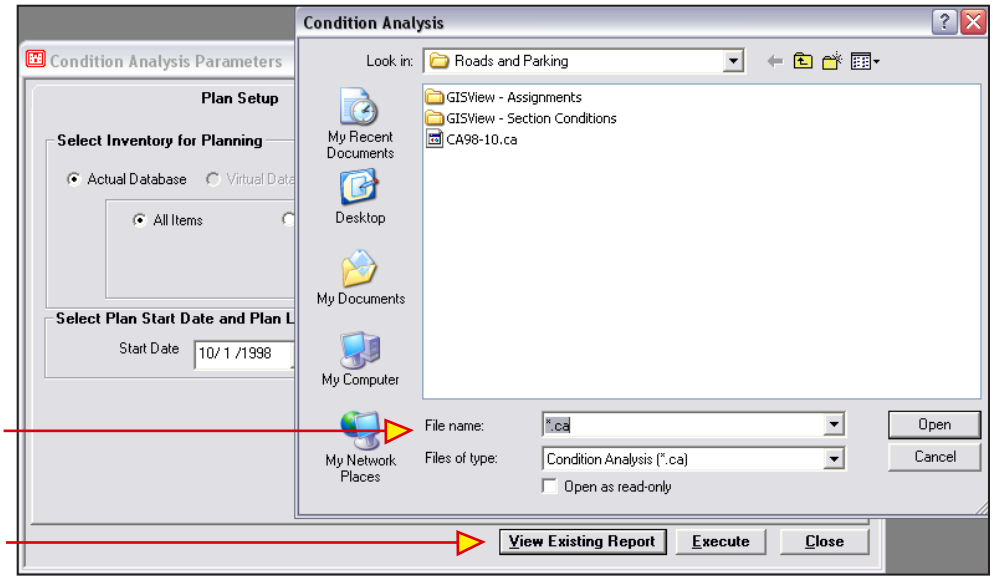


- To save the report, click Close and then Yes. Save the report to the C drive and name it CA98-10.ca.

Save the analysis for viewing at a later time



- To open a saved report, select Condition Analysis >> View Existing Report. Select your saved report and then click Open to view the report.



Navigate to the saved analysis

Select to open a previously saved analysis

Workshop 14: M&R Work Plan

Objective

Develop several 5 year maintenance planning scenarios.

Database

Open the Mansfield_2007 database by clicking File >> Open Database, selecting Mansfield_2007.pvr and clicking Open.

Tasks

1. $300,000/Year (Hint: use "Limit To Budget" option) using a single budget.
2. How much money is required to maintain the current condition (Hint: use iteration)?
3. How much money is needed to eliminate the backlog of maintenance over 5 years?

- For each of the budget scenarios:
  - Start & Program Dates: Today's Date (Default)
  - Years In Plan: 5
  - Default Priority Table
  - Inflation Rate: 3 %
  - Do not use Global Maintenance
  - Compare the 3 scenarios. Which is most cost effective?
  - View the results of the work plan in the GIS viewer. In what ways would the GIS view help you in reporting the results of the plan? In what ways would the GIS view help you in planning work and developing projects?
- When closing the report viewer, you will be prompted to, and should, save the report outputs for each scenario, as the reports will be later utilized.

Hints & Solution Guide For Workshop 14

1. M&R Plan — Plan using a Specific Budget Amount:

- Open the M&R Plan module on the PAVER™ button bar.

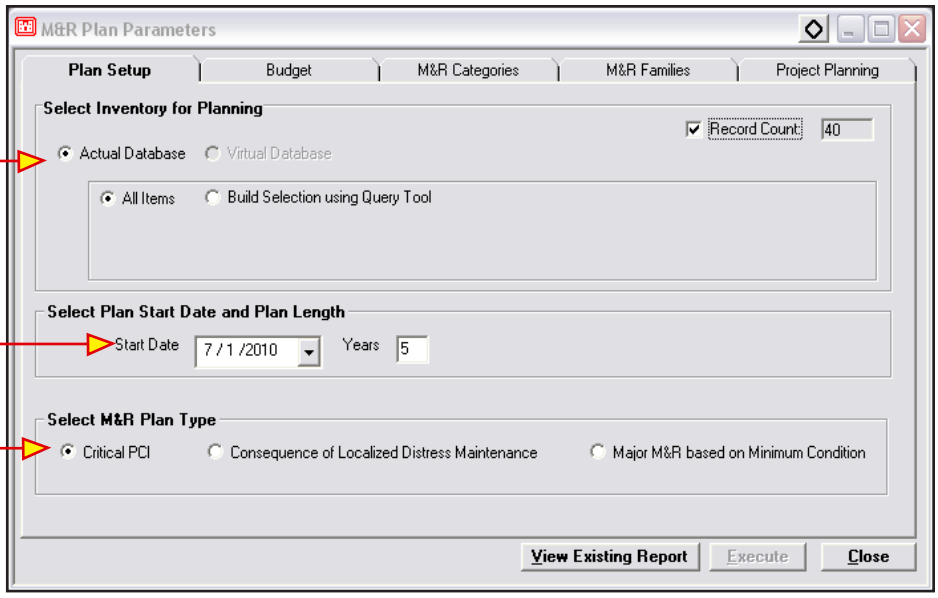
File Tables Preferences Add-Ins Window Help
Inventory Work PCI Reports Pred. Modeling Cond. Analysis M&R Plan GIS/Tree Sel. List Sel. Wizards Visual Menu Help 6.0 About

- On the Plan Setup tab, the M&R plan will be executed on the entire database.
- Start the plan on today's date, run the plan for 5 years, and select the Critical PCI method for the M&R Plan Type.

Use the actual database

Select the start date and plan length

Select Critical PCI plan type

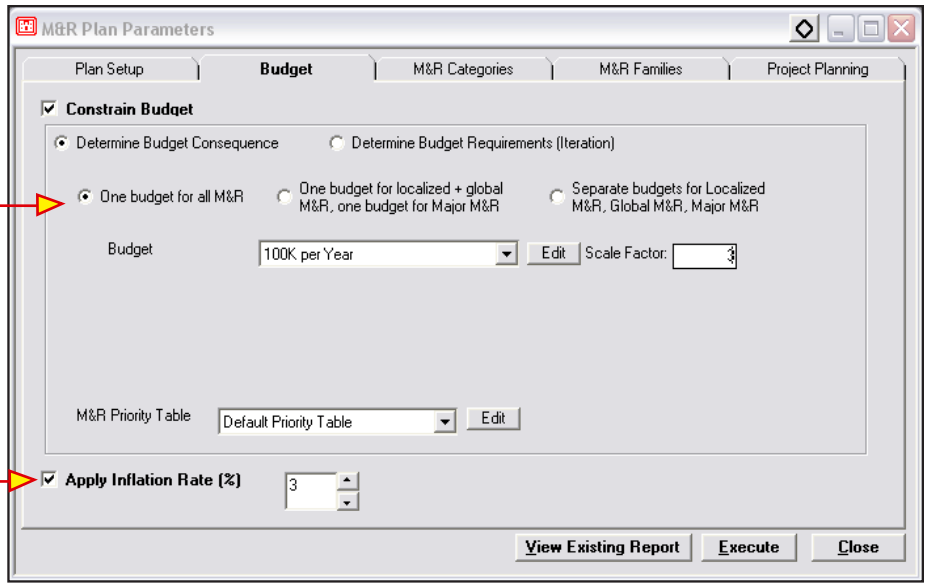


- On the Budget tab select Determine Budget Consequences.
- In Budget Consequences, select 100K per year in the Budget drop-down box. Set the Budget Scale Factor to 3.0 and apply an Inflation Rate of 3%.

Note: There are three types of budgets, a single budget for all M&R, a split budget where one is for localized + global M&R and the other is for major M&R, and the last budget scenario splits the localized M&R, the global M&R and the major M&R into their own separate budgets. In this workshop we will only be using the single budget.

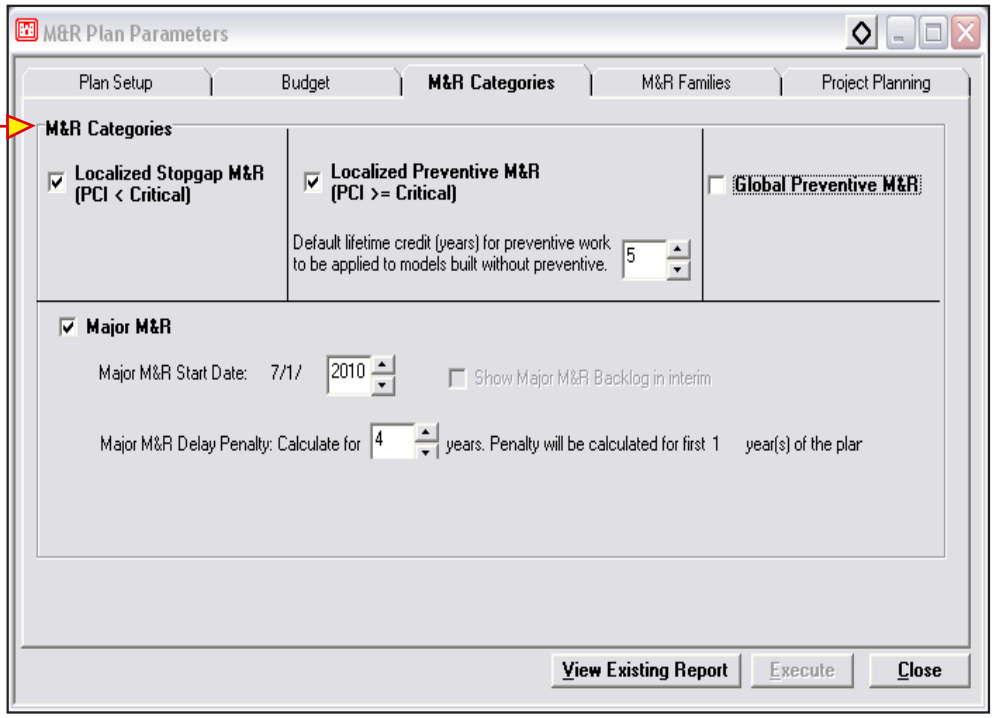
Select One Budget

Select inflation rate

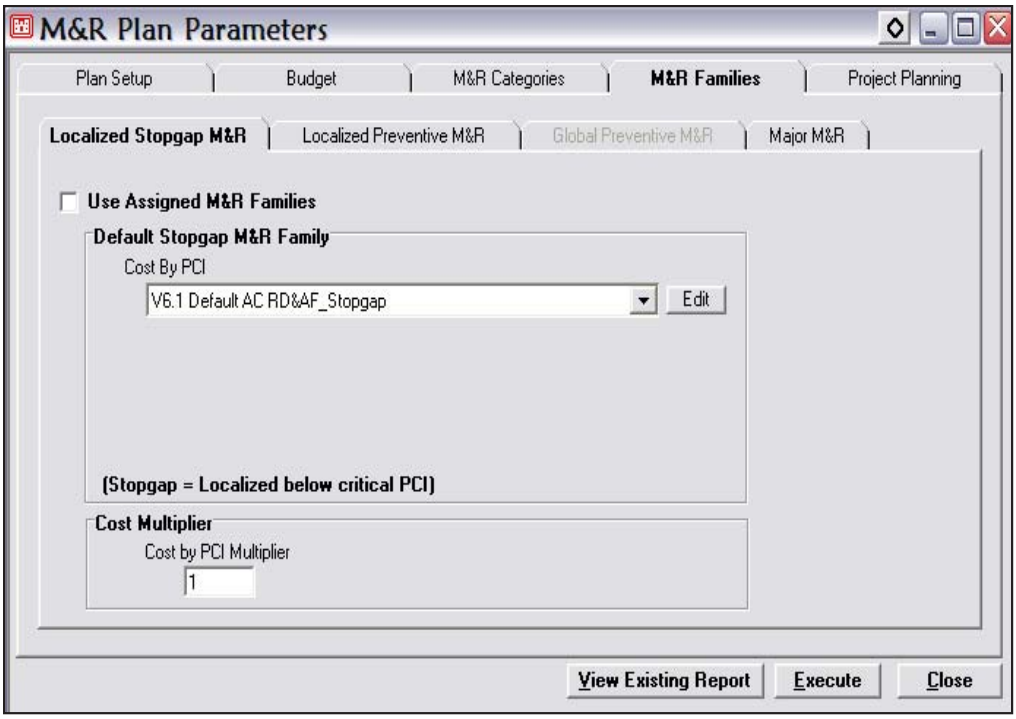


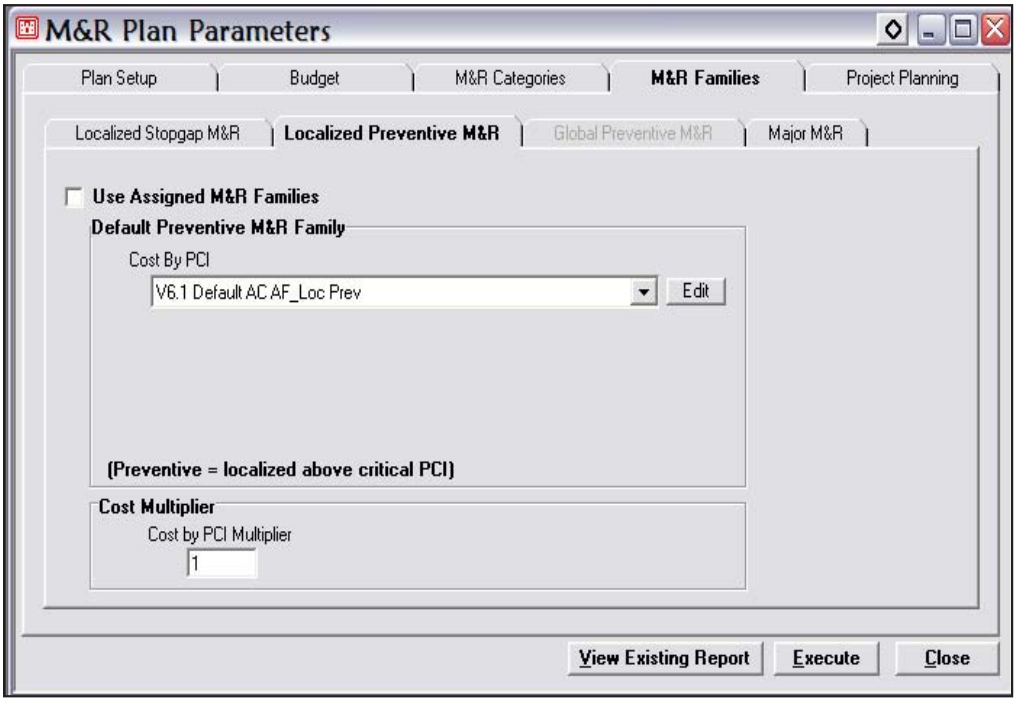
- On the M&R Categories tab, place checkmarks next to (allowing for) Localized < Critical, Localized > = Critical (use a lifetime credit of 5 years for preventative work), and Major M&R (Calculate a Major M&R delay penalty cost of 4 years, and do not place a checkmark next to Global).

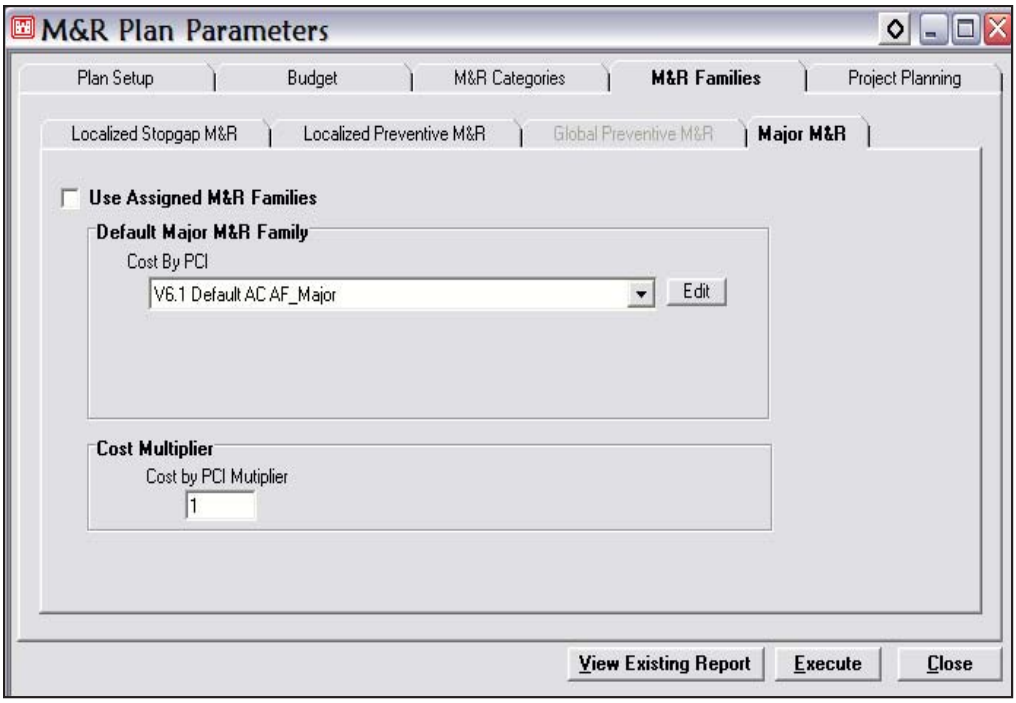
Select M&R categories to include in the analysis



- On the M&R Families tab there are tabs for each of the M&R Categories, allowing previously created M&R Families to be assigned.


M&R Plan Parameters
Plan Setup
Budget
M&R Categories
M&R Families
Project Planning
Localized Stopgap M&R
Localized Preventive M&R
Global Preventive M&R
Major M&R
Use Assigned M&R Families
Default Stopgap M&R Family
Cost By PCI
V6.1 Default AC RD&AF_Stopgap
Edit
(Stopgap = Localized below critical PCI)
Cost Multiplier
Cost by PCI Multiplier
1
View Existing Report
Execute
Close

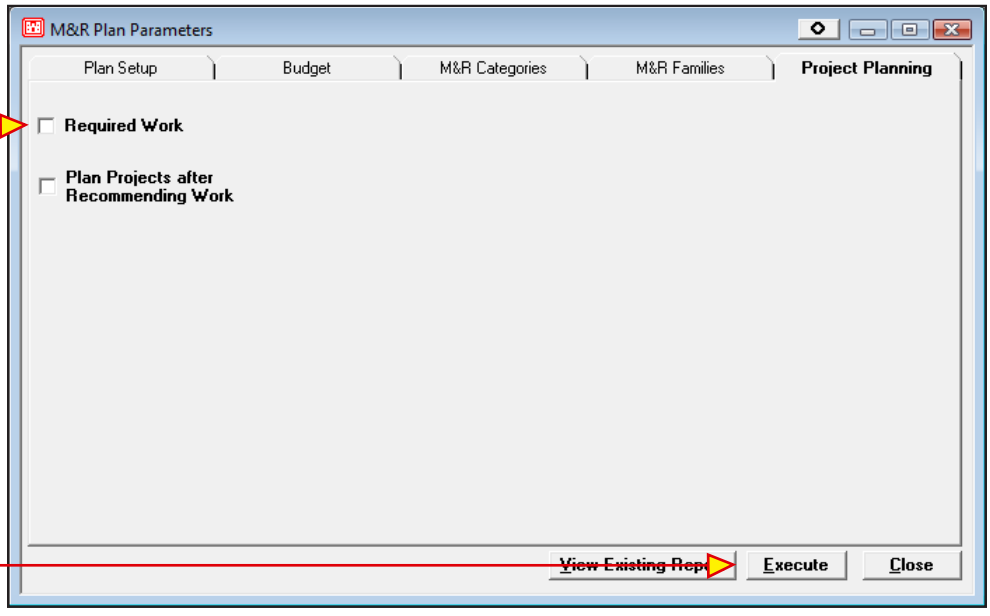

M&R Plan Parameters
Plan Setup
Budget
M&R Categories
M&R Families
Project Planning
Localized Stopgap M&R
Localized Preventive M&R
Global Preventive M&R
Major M&R
Use Assigned M&R Families
Default Preventive M&R Family
Cost By PCI
V6.1 Default AC AF_Loc Prev
Edit
(Preventive = localized above critical PCI)
Cost Multiplier
Cost by PCI Multiplier
1
View Existing Report
Execute
Close

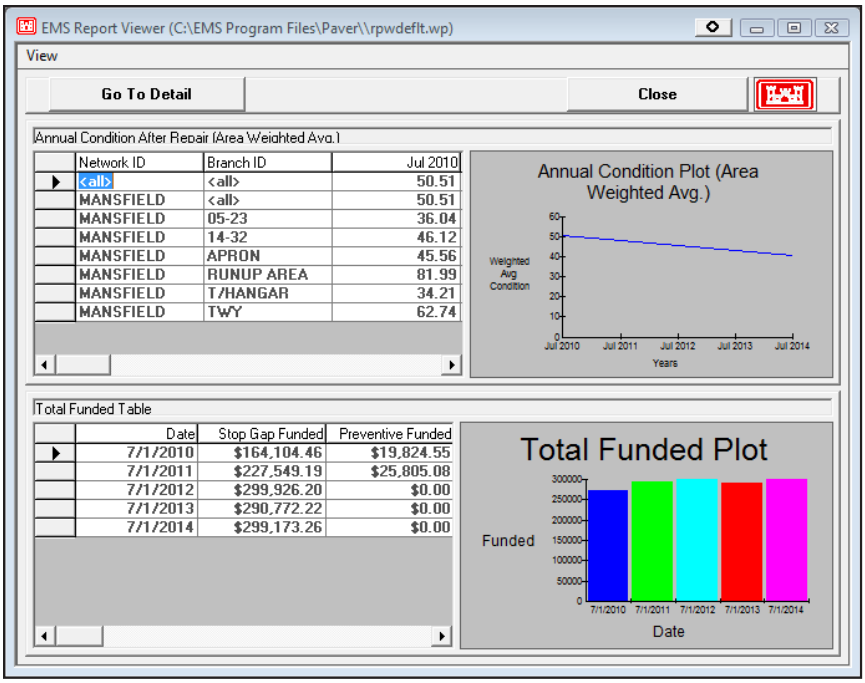


- Now select Execute to run the M&R Work plan.

Don't include any planned work in analysis

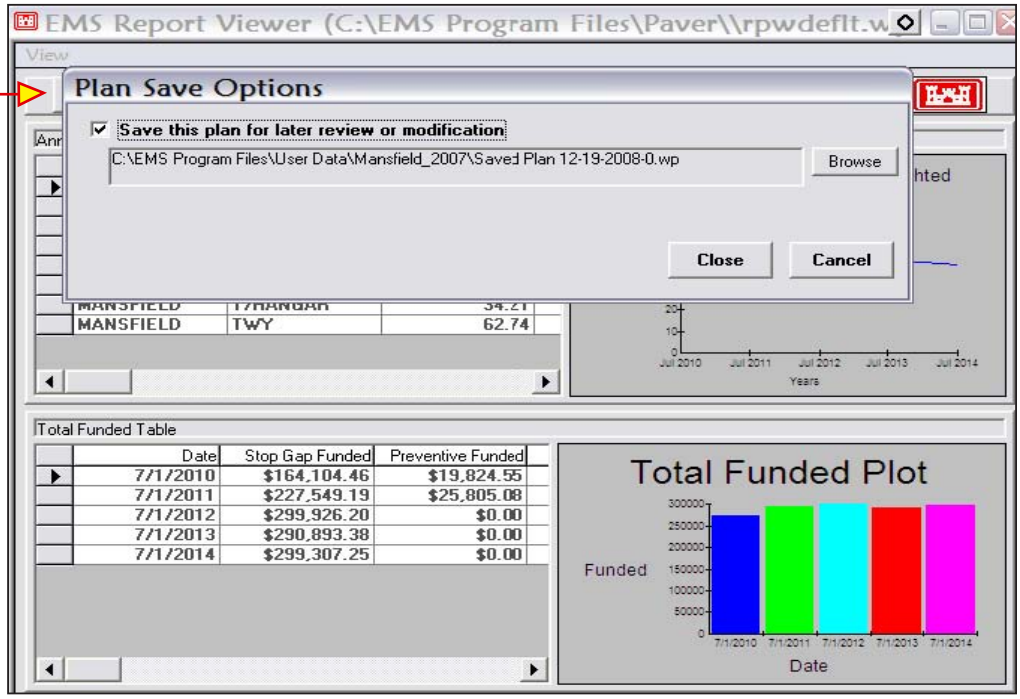
Select Execute to run and view the M&R Work plan results





- After reviewing the results, close the window and PAVER™ will prompt you to save the report. Save the report as 300k.wp by checking Save this plan for later review or modification >> Browse >> type "300k.wp" in the Mansfield _2007 folder >> and select Save. The Plan Save Options form can be seen below.

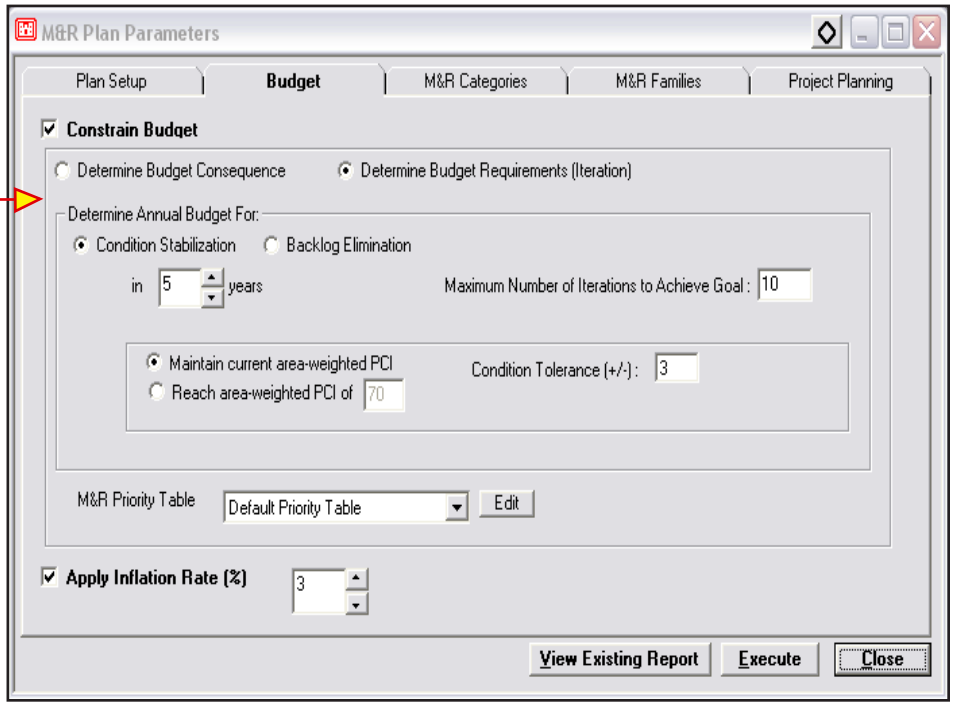
Save the plan



2. M&R Plan — Maintain Current Condition:

- Everything will be the same based on the previously run report, except for the budget input parameters.
- On the Budget tab, select Determine Budget Requirements (Iteration).
- Under the Determine Budget Requirements (Iteration), select Condition Stabilization in 5 years.
- Set the Maximum Number Of Iterations To Attempt Goal to 10, apply the inflation rate of 3%, and click Execute to run the report.

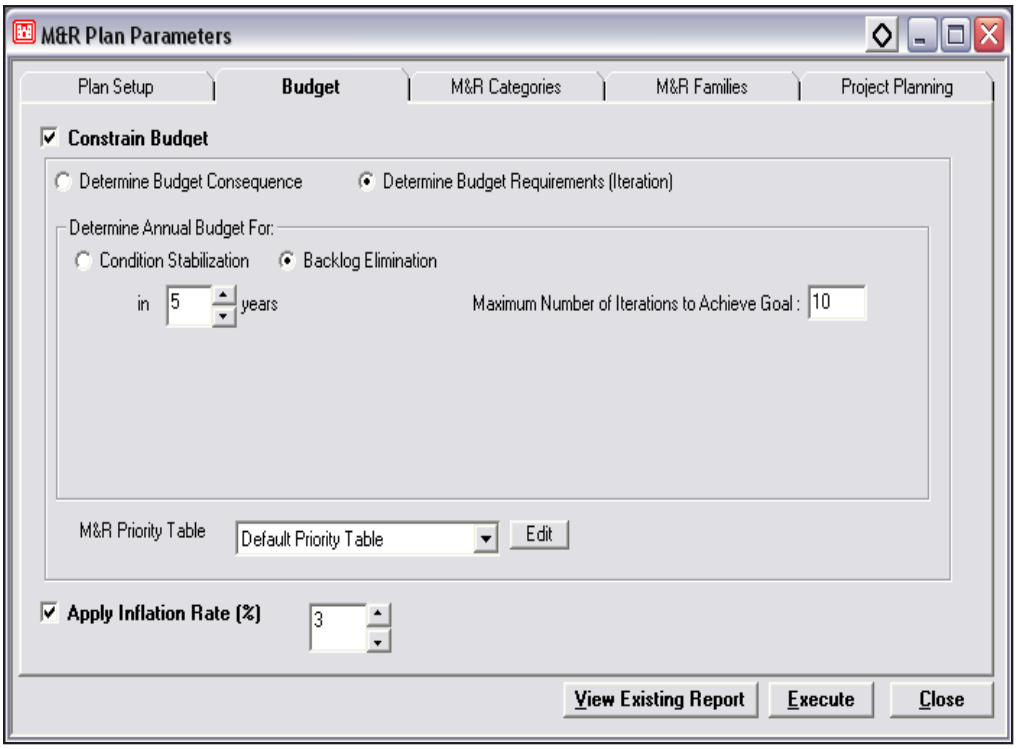
New budget parameters



- After reviewing the results, close the window and save the report as MaintPCI.wp, as done before with the 300k report.

3. M&R Plan — Eliminate Backlog In 5 Years:

- Everything will be the same based on the previously run report, except for the Budget input parameters.
- On the Budget tab, select Determine Budget Requirements (Iteration).
- Under the Determine Budget Requirements (Iteration), select Backlog Elimination in 5 years.
- Set the Maximum Number Of Iterations To Attempt Goal to 10, apply the inflation rate of 3%, and then click Execute to run the report.



- After reviewing the results, close the window and save the report as Bklog.wp, as done before with the 300k report.

Workshop 15: Project Planning

Objective

Plan projects using the M&R Planner.

Database

Open the Mansfield_2007 database by clicking File >> Open Database, selecting Mansfield_2007.pvr and then clicking Open.

Tasks

1. Develop a 10 year work plan that will eliminate all of the Major M&R backlog in 5 years.
2. After the M&R Plan has been executed and the results analyzed, plan two separate projects using the Work Planner.

Hints & Solution Guide For Workshop 15

1. Develop a 10 year eliminate backlog work plan using the Mansfield_2007 database.

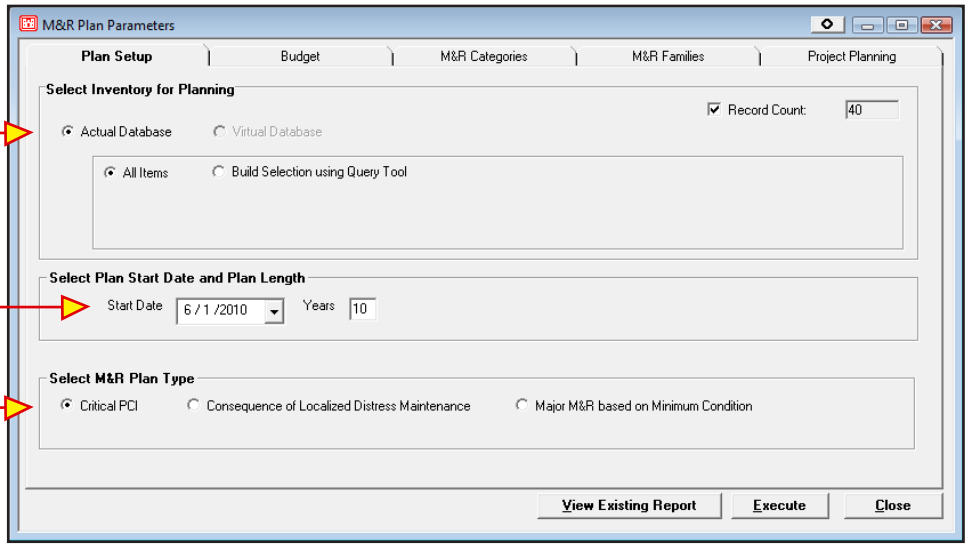
- Open the M&R Plan tool by selecting it from the PAVER™ button bar.

- Insert the information as shown in the following images, within each tab of the M&R Plan Parameters window. PAVER™ will only allow dates greater than or equal to the current date, so adjust the dates as needed.

Use Actual Database

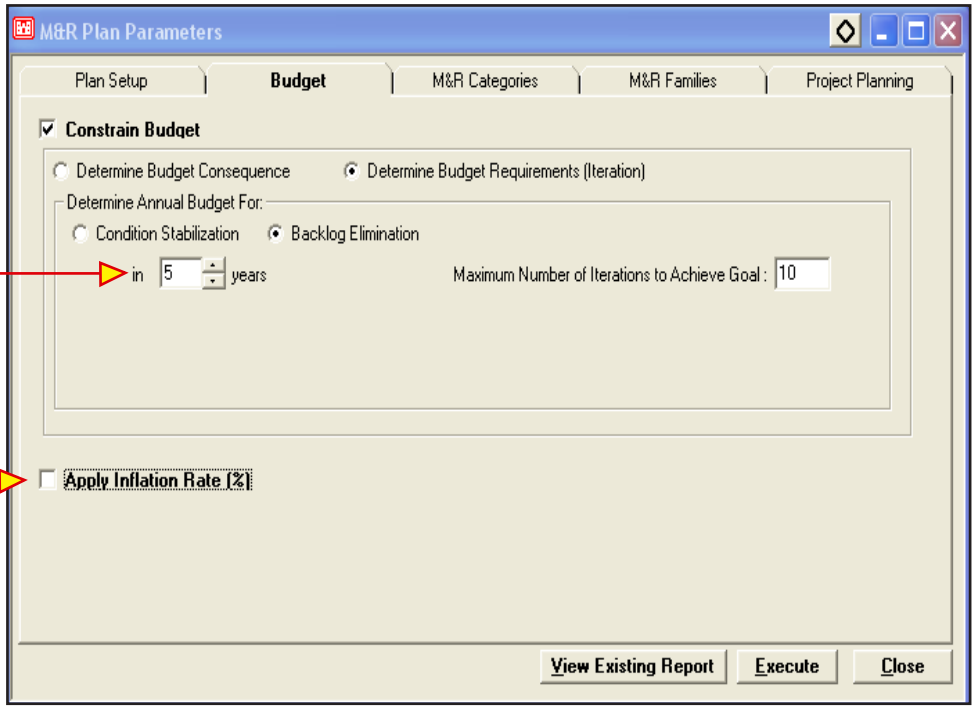
Plan start date and plan length (10 years)

Use the Critical PCI plan type



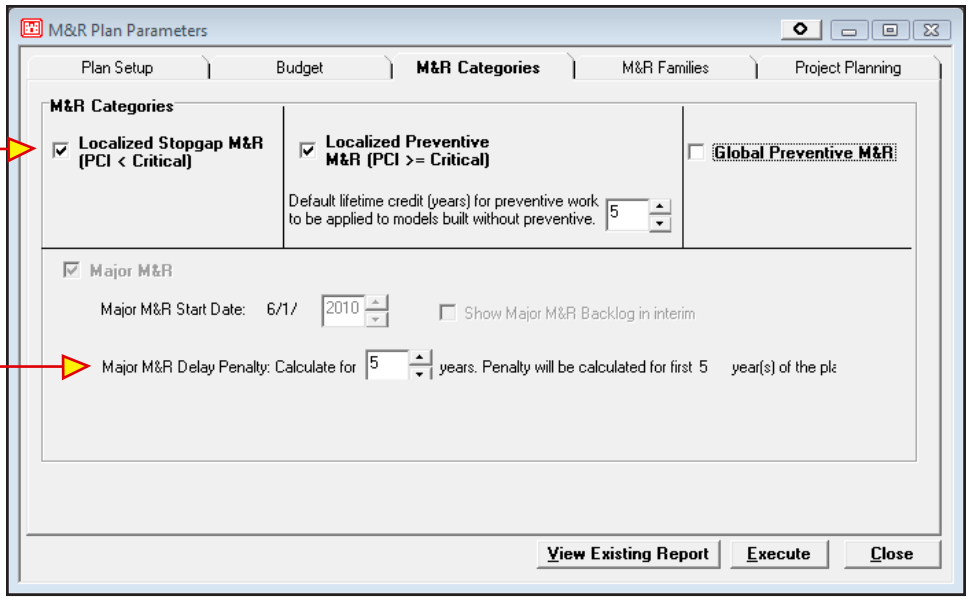
Determine budget requirements to eliminate backlog in 5 years

Do not use an inflation rate



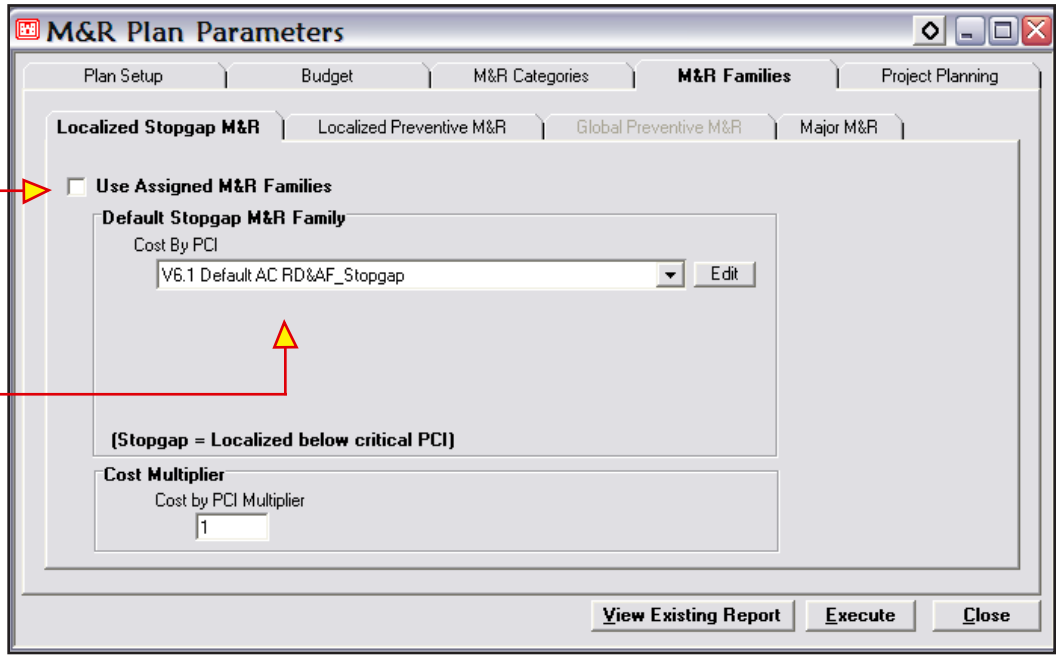
Use all of the M&R categories except Global

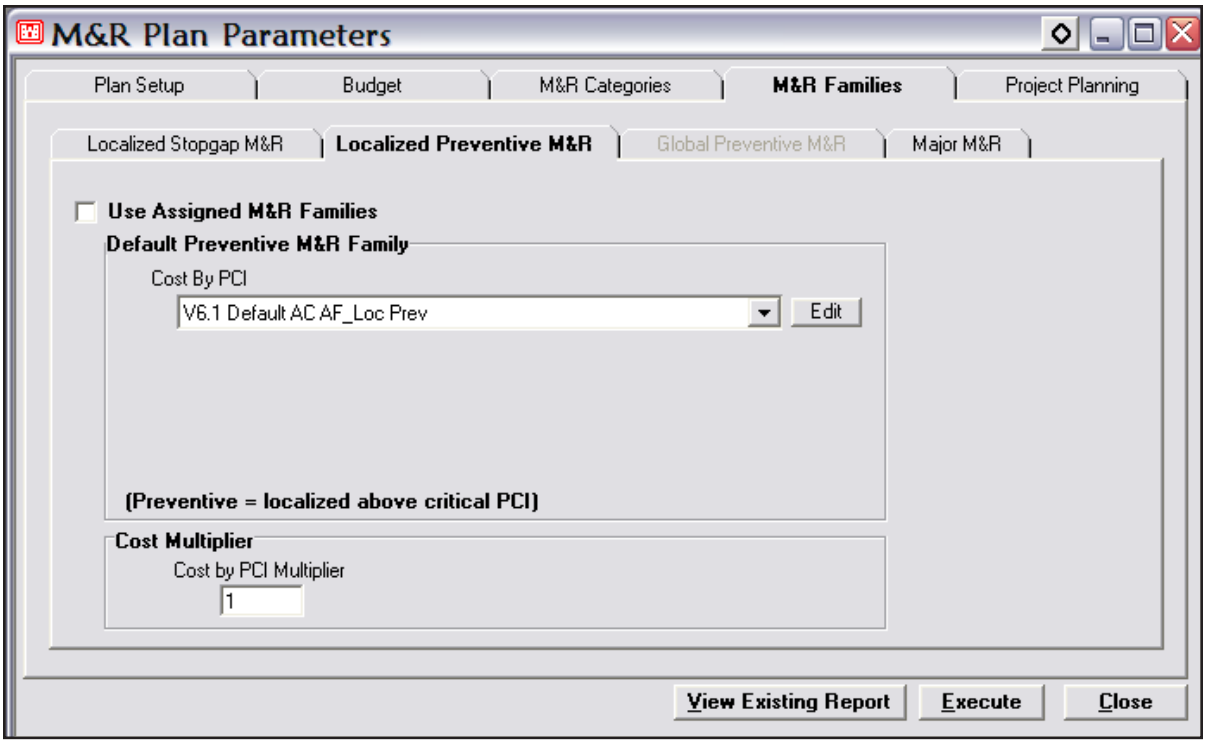
Calculate delay penalty for 5 years



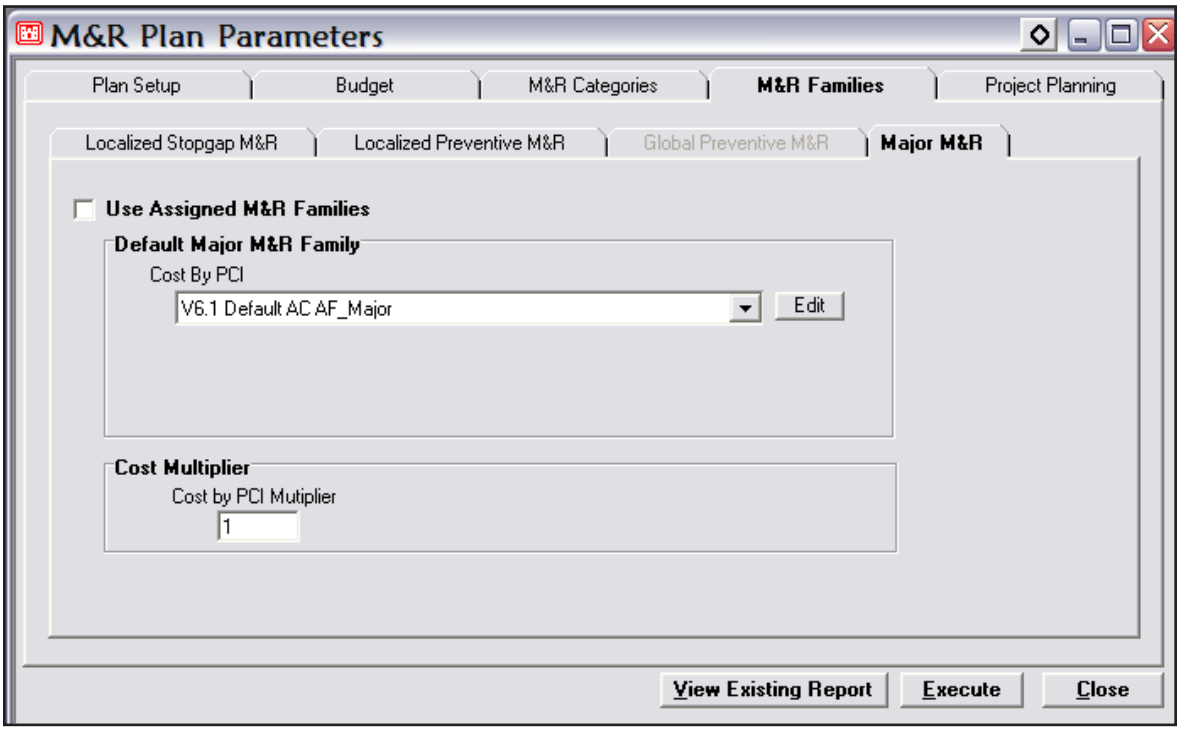
No M&R families have been assigned, so all sections will use the default M&R family

Use the cost tables as shown





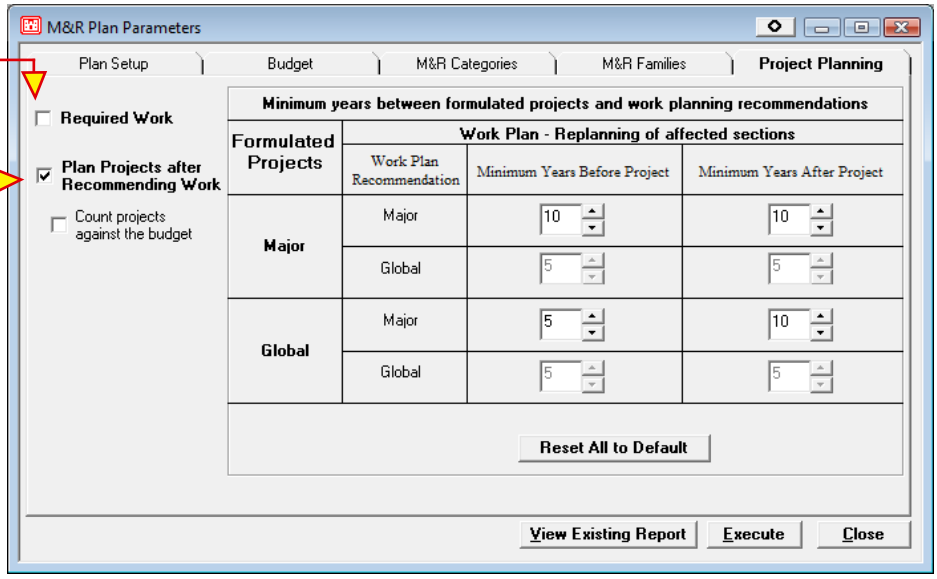
- Since the plan will exclude Global M&R (configured on the previous tab), we can skip the Global Preventative M&R tab.
- On the M&R Families >> Major M&R tab, the selected Cost By PCI is V6.5 Default AC AF_Major. Select Edit to view this table.



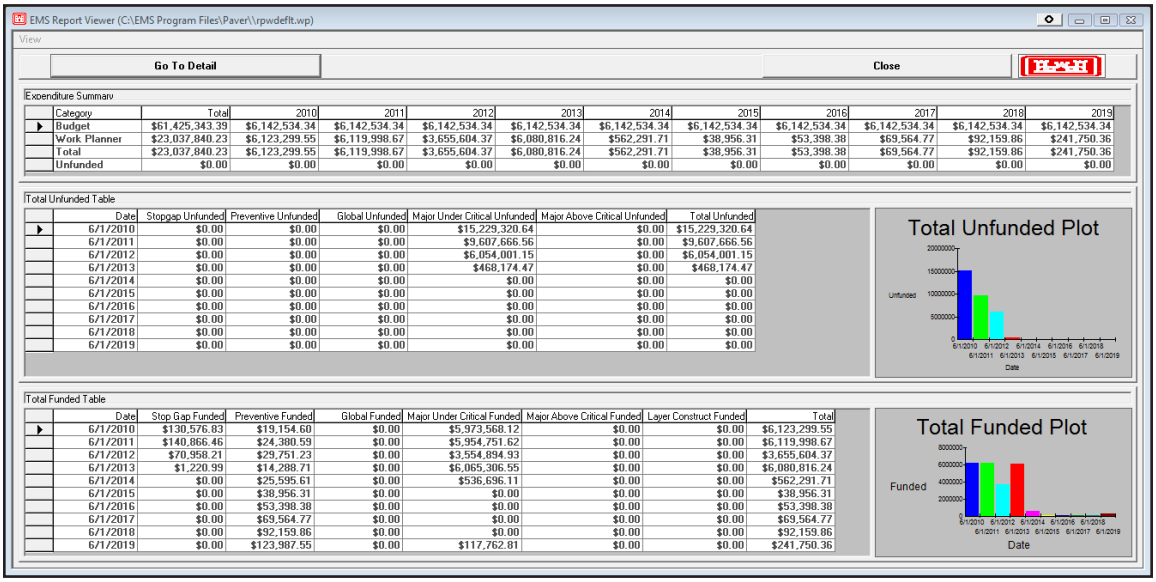
- To analyze where work needs to be allocated, run the Work Planner without including any Required Work (Planned Projects). After PAVER™ recommends work, projects will be planned. Select the options shown in the below image, and then click Execute.

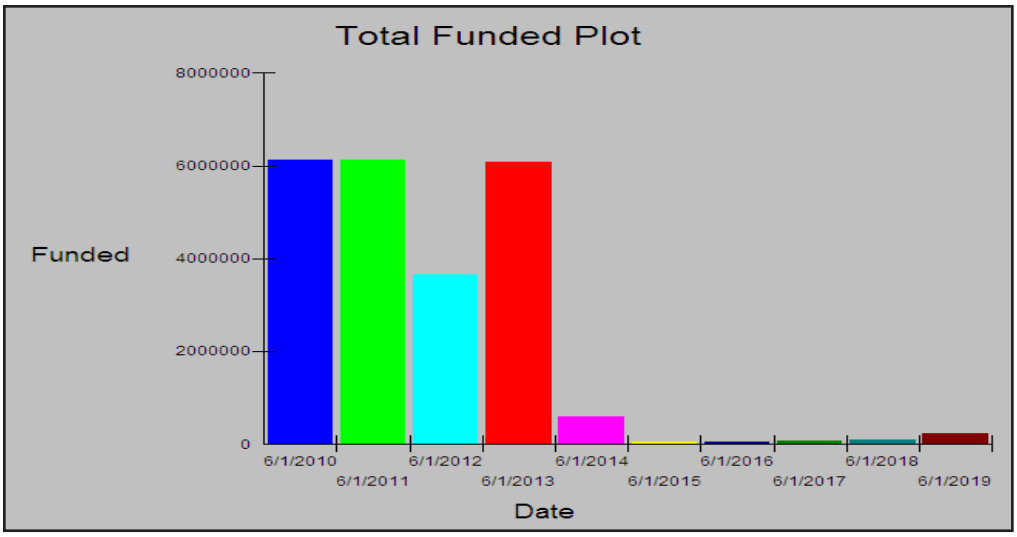
No required work has been planned yet, so don't include any

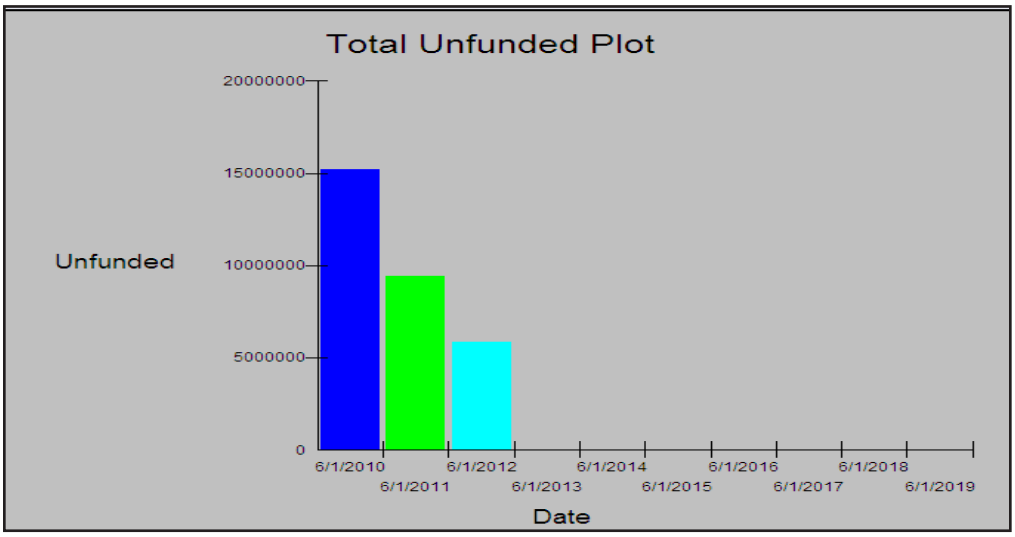
Select this box because after the plan is executed, projects will be planned



- After executing the Work Planner, several windows appear. Select the EMS Report Viewer form, and on that form select View (upper left hand corner) >> Summary >> Check the Total Funded Table, Total Unfunded Table, and Expenditure Summary Table. PAVER only allows you to check one of these tables at a time, so this process will need to be repeated.





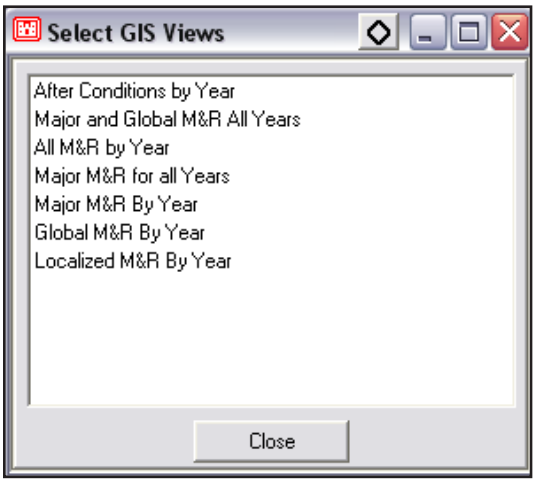


Expenditure Summary table

Category	Total	2010	2011	2012	2013	2014	2015	
Budget	$61,425,343.39	$6,142,534.34	$6,142,534.34	$6,142,534.34	$6,142,534.34	$6,142,534.34	$6,142,534.34	$
Work Planner	$23,037,840.23	$6,123,299.55	$6,119,998.67	$3,655,604.37	$6,080,816.24	$562,291.71	$38,956.31	
Total	$23,037,840.23	$6,123,299.55	$6,119,998.67	$3,655,604.37	$6,080,816.24	$562,291.71	$38,956.31	

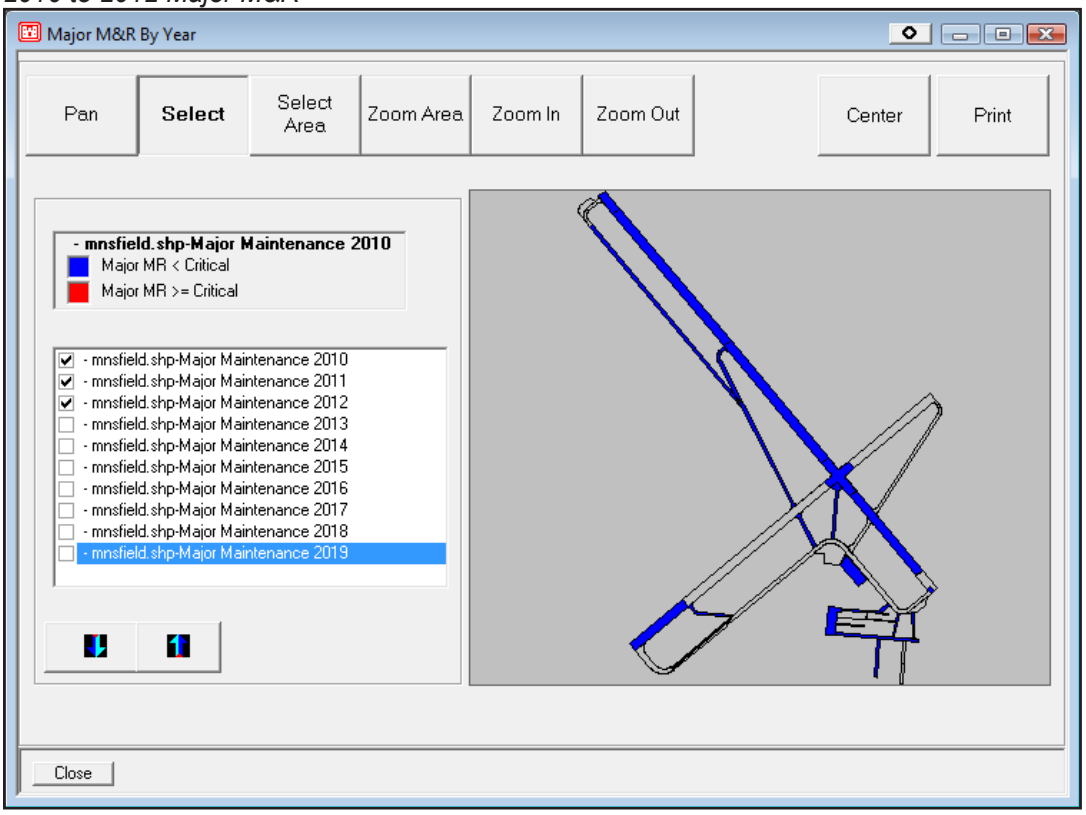
- To view the delay penalty costs associated with each section, select View >> Detail >> Delay Penalty Details. Sort the sections based on their associated delay penalty cost by right-clicking on the table and selecting Change Sort Order. Within the Sort Order window, choose Delay Penalty and move it to the right column. To alternate between Ascending or Descending sort order, double-click Delay Penalty within the second column of the Sort Order window. After adjusting the Sort Order, click OK. Within the main view, the column order can be adjusted by selecting a column and dragging and dropping it to the desired position.

- Within the GIS Views form, select Major M&R By Year.



- Isolate the years 2010 to 2012 to view what Major M&R is recommended over the next four years. This is seen on the GIS map as shown below.

2010 to 2012 Major M&R

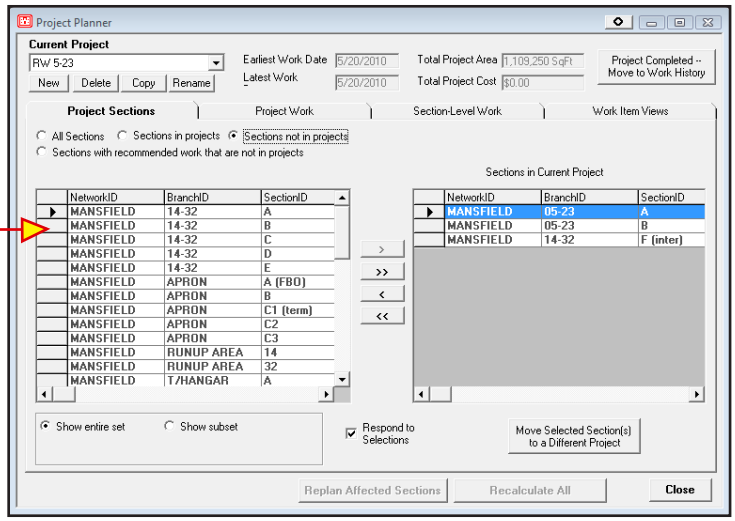


- As seen on the GIS map, MicroPAVER™ recommends Major M&R on the two AC runways (RW 5-23 & RW 14-32). In the next section, we will plan two Major M&R projects on these two runways. Do not close any of the forms.

2. Plan Projects using the M&R Project Planner.

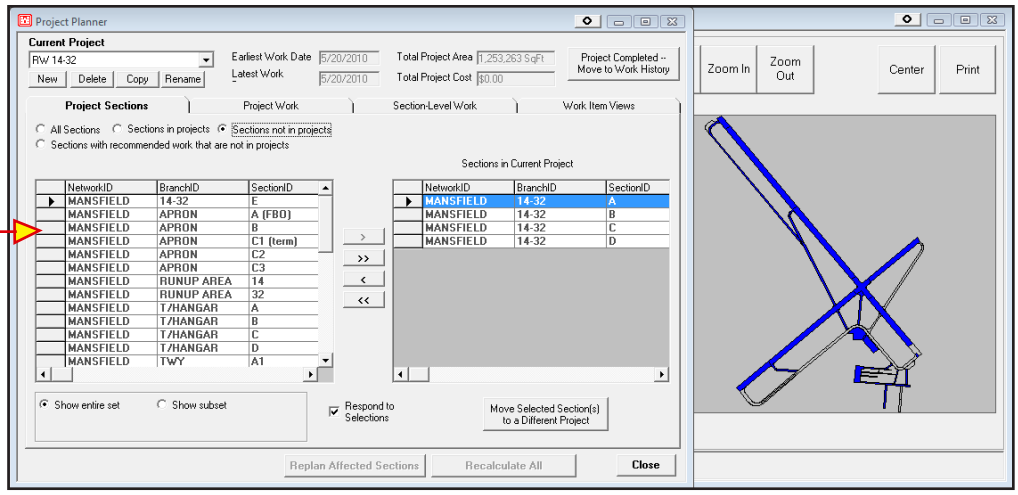
- Select the Project Planner form. Designate the first projects name by selecting New in the upper left-hand corner of the Project Planner form and, after naming the project RW 5-23, select OK. With the new project selected in the Current Project list box, add sections to the project by highlighting the section(s) to be added in the left-hand table, and clicking the single right-pointing arrow (sections in project RW 5-23 are shown in image below). Sections can either be added one at a time, or multiple sections can be added by highlighting them while pressing the Ctrl button, and then moving them to the Section In Current Project right-hand table. The single arrow moves only highlighted sections, while the double arrows move the entire list. The following image shows the sections that have been added to the project.

Assigned projects



- After assigning the above sections to the project, add an additional new project named RW 14-32. Sections can also be selected/ highlighted through the GIS view. Select the Major M&R By Year option on the GIS view form, and configure your screen to display both the Project Planner window as well as the GIS view, as seen below. Single-click on each of the four sections, seen below, individually to see that the Project Planner window responds and highlights each of the sections. Include each of these sections in the RW 14-32 project.

Select these sections on the map and assign them to the Taxiway project



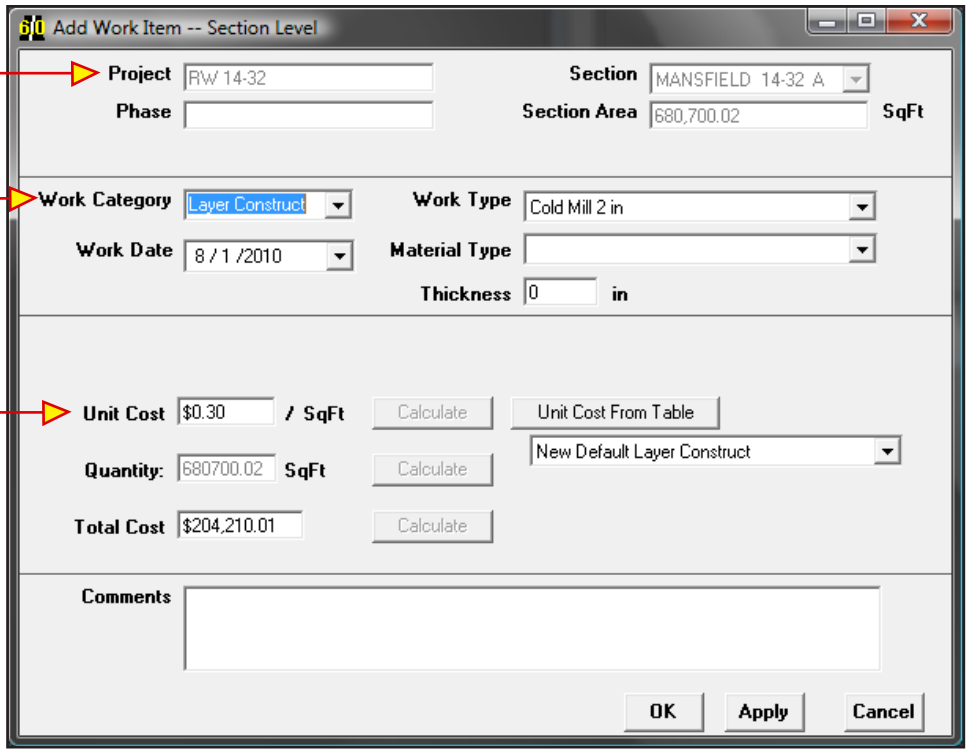
After the sections have been assigned to the two projects, work items can be added. On the Project Planner window there are three other tabs named Project Work, Section-Level Work, and Work Item Views. The Project Work tab is where work items are assigned to an entire project (every section), while the Section-Level Work tab is where work items can be assigned to individual sections in a project. The Work Item View tab is where all work, project or section level, can be reviewed. For this workshop, both Project-Level and Section-Level work items will be used for the two projects. For the Section-Level Work:

- First select the project called RW 14-32 in the Current Project list. Now proceed to the Section-Level Work tab, where all of the sections assigned to this project are shown in the left table. To add work items to section 14-32_A, highlight 14-32_A and then select Add. Fill in the Add Work Item window as shown in the image below. Manually enter a Unit Cost of 0.30 $/SqFt and click the lower Calculate button to calculate the Total Cost. Be sure to enter a work date of 8/01/2009.

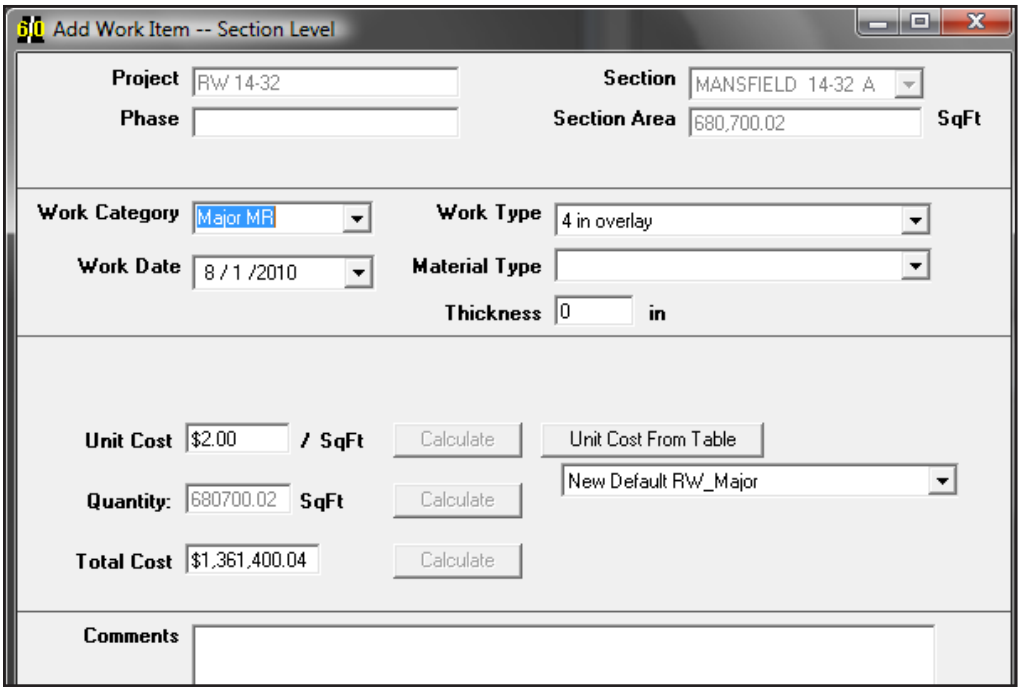
Project and section to which work will be applied

Add layer work and select work type to add to a project. Select the start date of the work.

Enter the unit cost for the work item, and calculate the total cost of the work

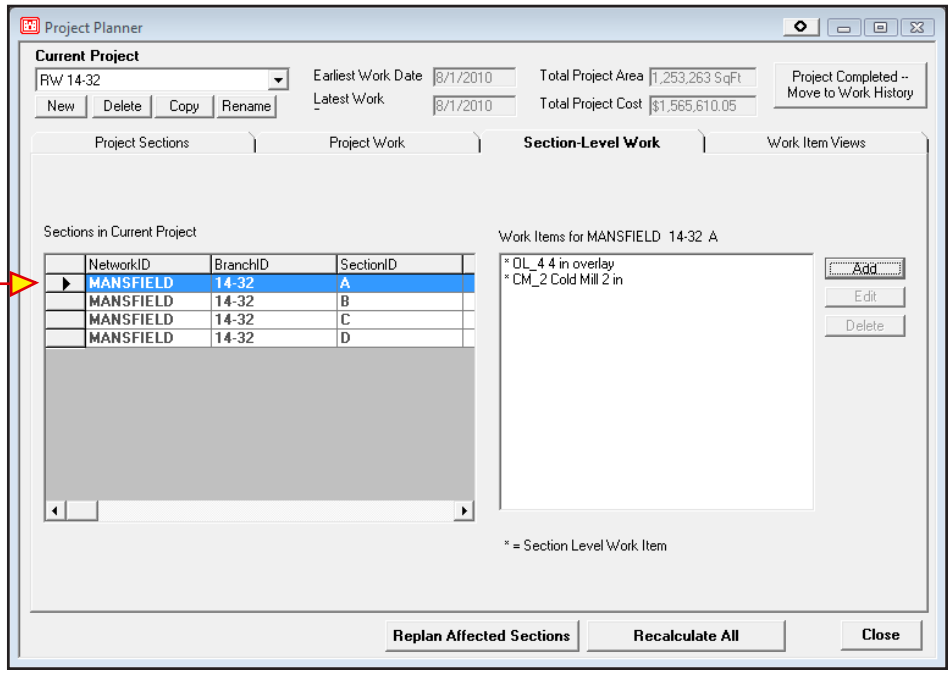


- After this table is complete, either choose Apply to add the work item and then continue to add work items, or OK to return to the Project Planner >> Section-Level Work tab. Add another work item by choosing Apply and entering in the next work item as shown in the image below. Enter a Unit Cost of 2.00 $/SqFt and again, enter a work date of 8/01/2010.



- After this is complete, select OK. On the Project Planner >> Section-Level Work tab, the work items added for section 14-32_A are listed in the table on the right, as shown in the below image.

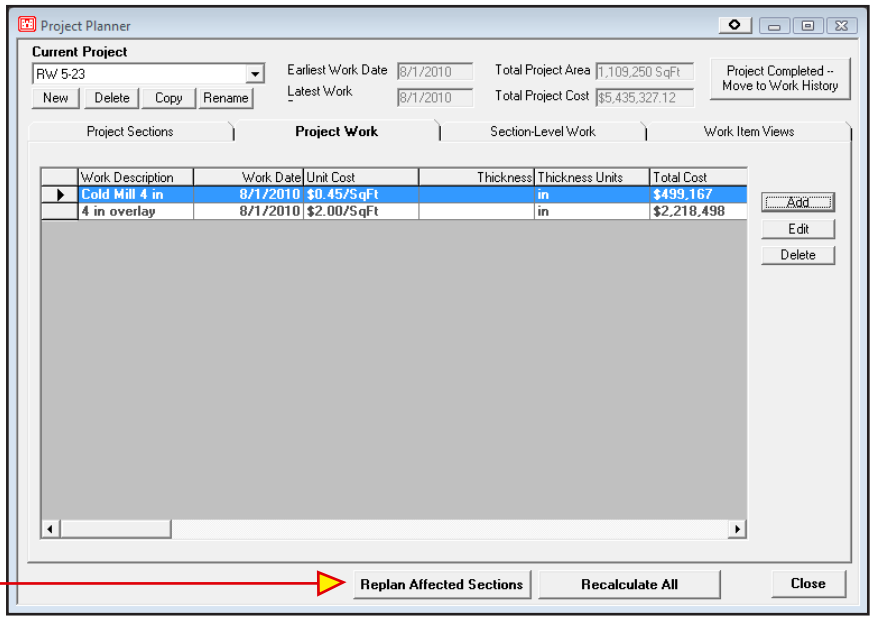
Project sections and work items added to the highlighted section



- These work items have only been assigned to this section. Add the exact same work items to sections 14-32_B & 14-32_C. For section 14-32_D, add a 2” Overlay Major work item only, using a Unit Cost of 1.20 $/SqFt. Enter a date of 8/01/2010 for each of these work items as well. After this is complete, review the work items assigned to the sections by highlighting them on the Project Planner >> Section-Level Work tab.

■ To add Project-level work:

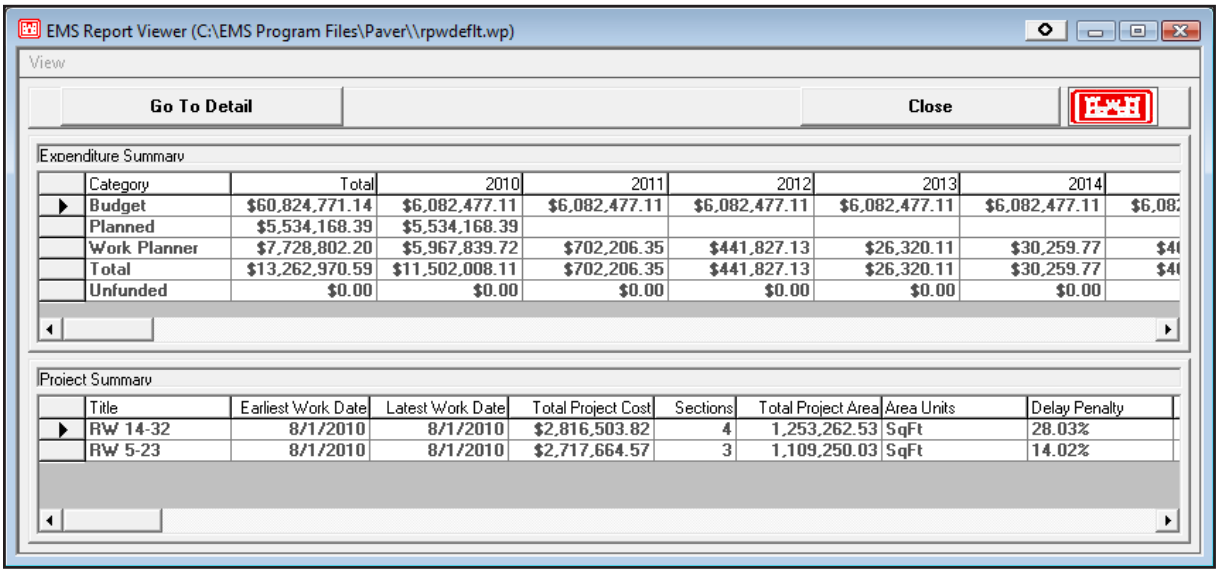
- To add Project Work items to the RW 5-23 project, select this project in the Current Project list box and then go to the Project Work tab. To add work to the entire project, click Add. The two work items to be added are Cold Mill 4” (Layer Construct Work Category) and 4” Overlay (Major M&R Work Category). Use Unit Costs of 0.45 $/SqFt and 2.00 $/SqFt respectively, with a construction date of 8/1/2010. After the work items have been added, the Project Planner >> Project Work tab should look like the image below.



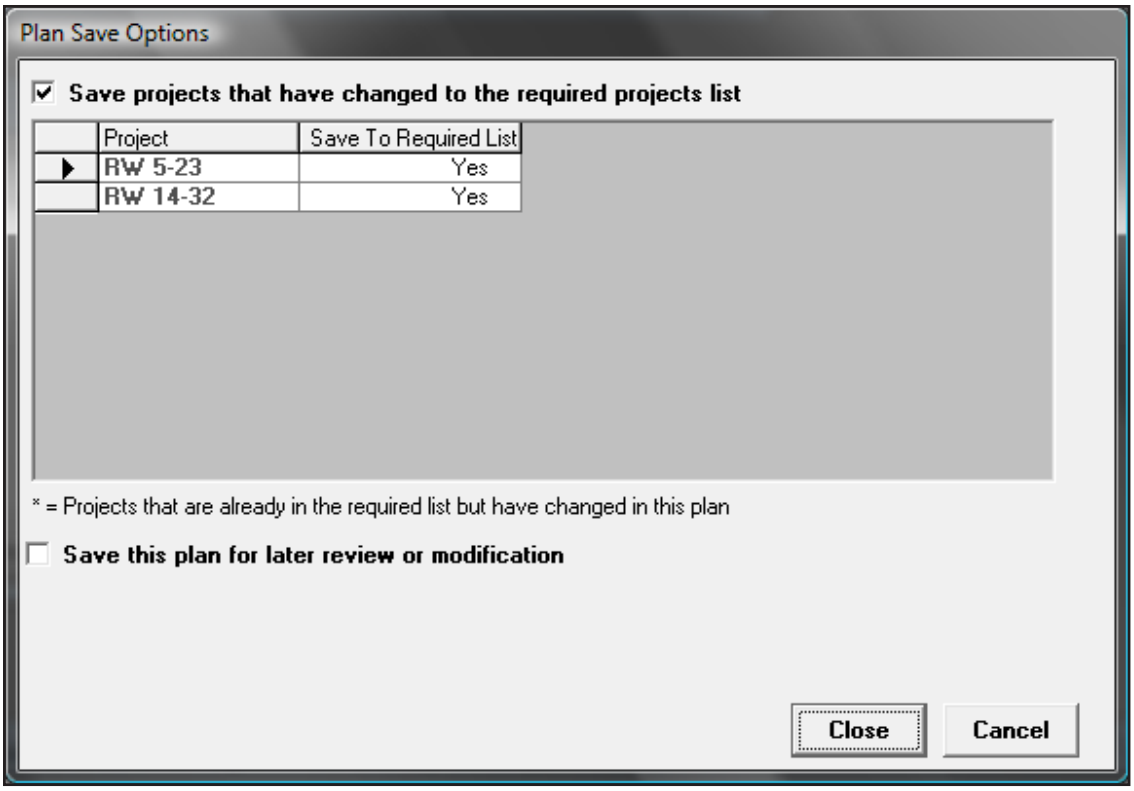
Recalculate All Button

- After all work items have been added to both projects, click on Recalculate All, and the M&R Plan will be re-executed, including the created projects. This button is shown above, on the Project Planner form.

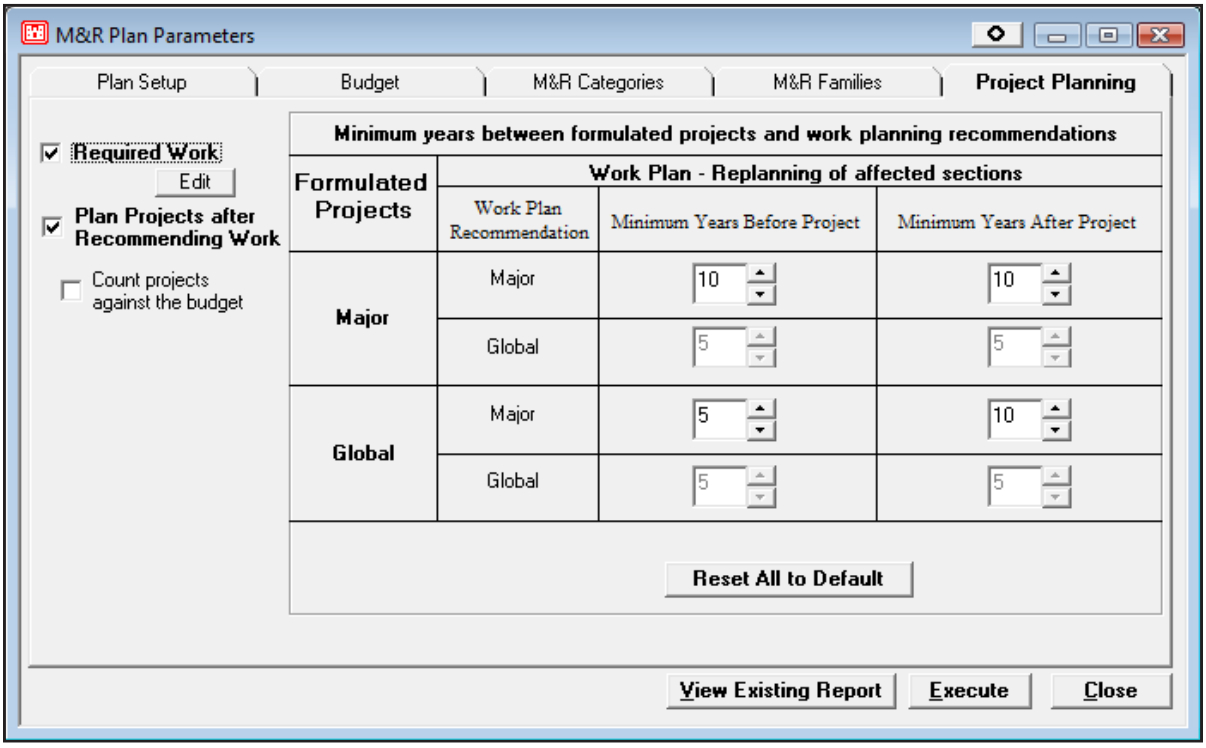
- Review the results of the added projects. The views below include the projects on both the Summary view >> Expenditure Summary and Project Summary tables. It is important to mention that these projects are not counted against the budget, because this criteria was included on the original M&R Plan analysis.



- After viewing the tables, close out of M&R plan and save the projects as required as seen below.


Plan Save Options
Save projects that have changed to the required projects list
Project
Save To Required List
RW 5-23
Yes
RW 14-32
Yes
* = Projects that are already in the required list but have changed in this plan
Save this plan for later review or modification
Close
Cancel

- Now that the projects have been labeled as required work, reopen the M&R Plan and rerun the analysis exactly as it was before, but include the required work as seen below. Execute the Plan.



- After the plan has been Executed, view the planned projects on the GIS map by selecting the Project Assignments view on the GIS form.

Select Project Assignments GIS view